The Iron Age

A Review of the Hardware, Iron and Metal Trades.

Published every Thursday Morning by DAVID WILLIAMS, No. 83 Reade Street, New York. Entered at the Post Office, New York, as Second-Class Matter.

Vol. XXVI: No. 20. *New York, Thursday, November 11, 1880.* *$4·50 a Year, Including Postage. Single Copies, Ten Cents.*

An Adaptation of Bessemer Plant to the Basic Process.

BY A. L. HOLLEY.*

The maintenance of refractory linings in Bessemer converters, in such a way as to promote regular and maximum production, has been the subject of more experimenting than any other feature of the Be semer system, and it is still the least perfect and satisfactory feature, excepting, perhaps, the casting of steel. Linings are not only eroded by the mechanical action of the charge, but they are chemically decomposed by its various slags. The silica linings usually employed have, indeed, been so improved that an average of say 60 charges per 24 hours can be got out of a pair of converters, and the shifting of interchangeable converter bottoms (containing the tuyeres) is so rapid that it does not delay production, but the repairing of the fixed lining just above the tuyeres, where both mechanical and chemical action are most severe, is frequently the cause of delay, and the operation rapidly performed between heats is tedious and costly. The accumulations of slag on other parts of the lining must also be quarried out, else the converter will become too small for the charge.

These are the conditions of maintaining silica linings; but the difficulties are increased, probably about threefold, when the linings are made of lime, for the basic process. The basic process consists in removing phosphorus from the iron under treatment, by retaining the phosphorus oxidized by the blast, in a basic slag formed of say 20 per cent. of lime added to the charge. An acid (silica) lining would vitiate the basic slag, and would also be rapidly destroyed by it. Lime containing some magnesia, and produced by burning magnesia limestone (dolomite), is at present the only basic material successfully used for converter linings. It is usually made into bricks, which are hard burned and built up with mortar of similar material to form the lining.

Basic bottoms and tuyeres stand 10 to 15 charges, nearly equaling acid bottoms, and they may be readily changed; but basic linings, near the tuyeres, and also in other parts where abrasion is severe, wear rapidly, and must be frequently repaired by cooling the converter and inserting new bricks, or patching in some suitable manner. The converter is thus put out of use for at least 24 hours—a very serious delay to production. From a wide observation, the author feels safe in saying that a basic lining is rarely run above 60 charges without extensive repairs, and in some works repairs are made every time a bottom is set. With some irons there is also an accumulation of slag around the mouth of the converter; its removal sometimes also causes further delay.

The output of a pair of converters in Europe averages about half that of a pair of converters of the same size in the United States, and is often less than half. The limited endurance of basic linings in Europe is, therefore, a less conspicuous defect than it is here, where one converter must make 25 or 30 charges in 24 hours, so that the repairs of basic linings, as at present conducted, would keep an American plant idle half the time. This delay is really as important in Europe as it is here; the greater the output from a given plant the cheaper the product.*

In order, therefore, that the basic process may come into extensive use, basic linings must be so maintained that their output will nearly equal that of acid linings.

There are two reasonable conditions of improvement—the one is to prolong the endurance of basic materials, so that their repairs can be made with little delay, while the converter is in position for use. There seems to be little or no progress, or probability of immediate progress, in this direction. The other is the rapid and complete removal of worn lining and the replacement of a repaired one. A third system, seriously proposed, is to double or treble the entire converting plant. The only practicable way to replace a refractory lining (which cannot be handled by itself) is to replace the vessel which contains it. The worn portions of the lining may thus be repaired at leisure, in another part of the works, rather than in position for use, where repairs would retard output.

An obvious way to replace an entire converter lining is to replace the entire conveter. This system is already under construction in Europe. The method is also obvious—lifting the converter bodily out of its pillow blocks, and conveying it to the repair shed by means of an overhead traveller; then setting a repaired converter in place by the same means. Such a plant is doubtless cheaper than a duplicate plant, and its output should be materially greater than that of fixed converters. But the operation of changing an entire converter must be slow and tedious. When the arrangement is such that pillow-block caps are required, these must be loosened by unscrewing heavy nuts; then they must be made fast to the crane chain, lifted, traversed and set down. The blast-pipe connection must be broken, and possibly some

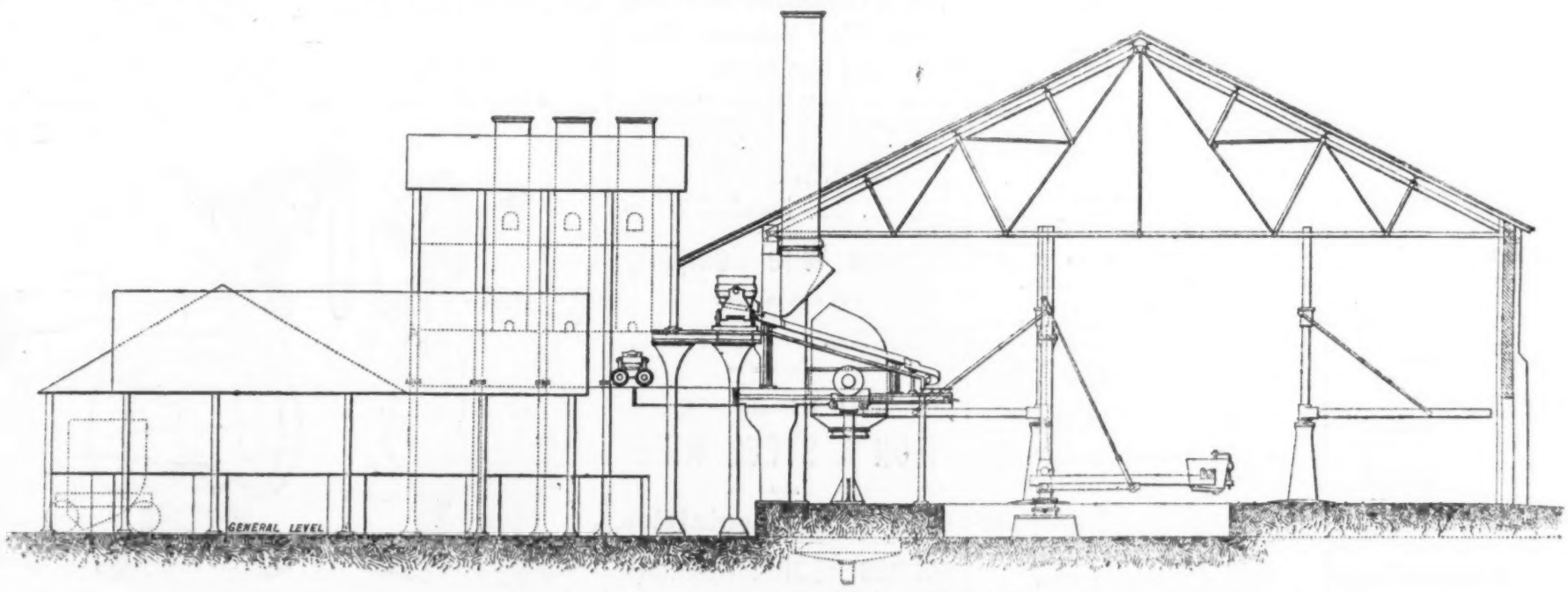


Fig. 1.—Elevation of a Bessemer Steel Plant for the Basic Process.

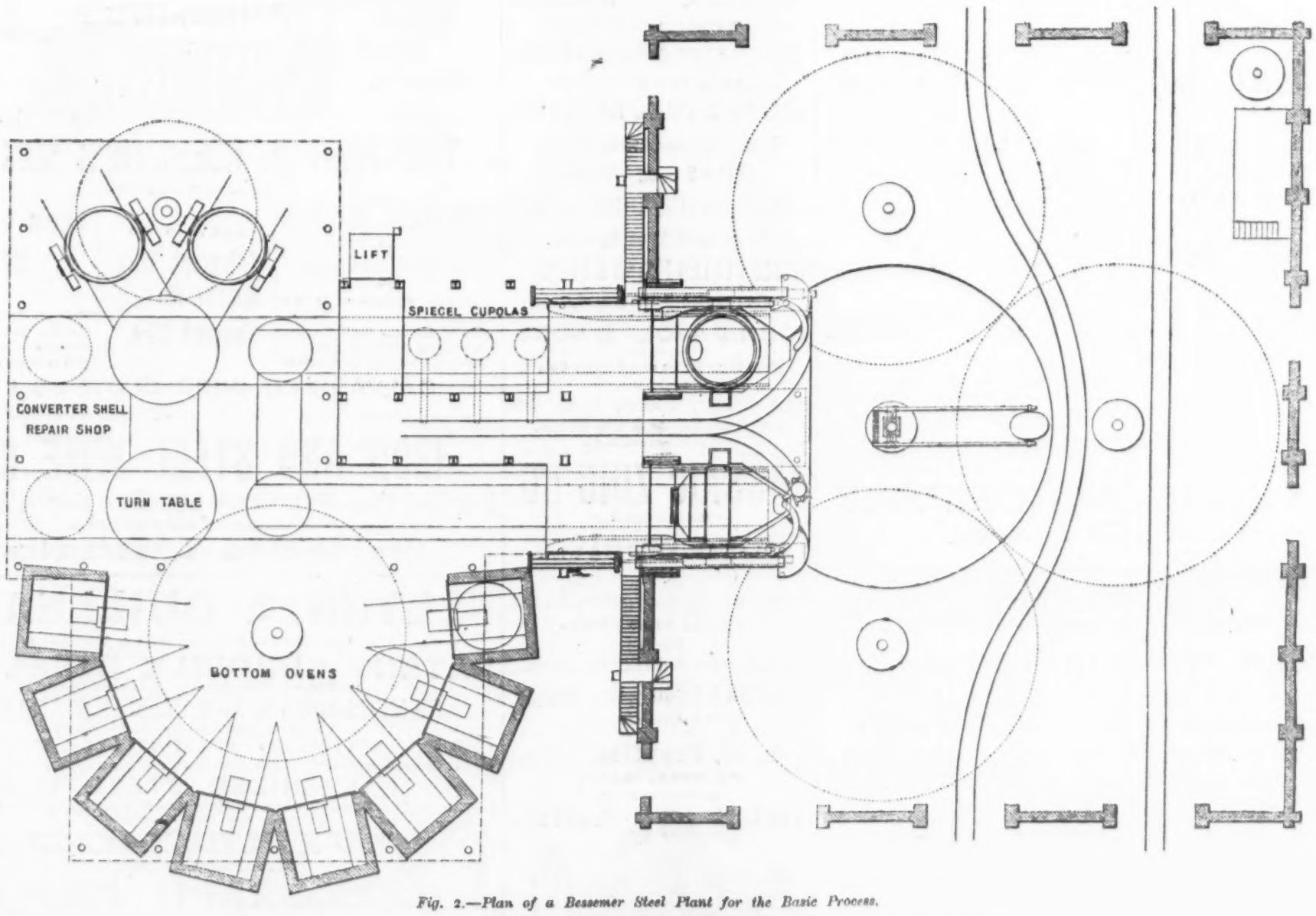


Fig. 2.—Plan of a Bessemer Steel Plant for the Basic Process.

HOLLEY'S PLANS FOR THE CONSTRUCTION OF A BESSEMER STEEL MILL WORKED BY THE BASIC PROCESS.

* Read before the New York meeting of the American Society of Mechanical Engineers.

* The statement sometimes made in England that the rapid production in America impairs quality of product, is but a cover for inadequate plant. Steel is obviously no better because five hours instead of one are consumed in setting a vessel bottom, or because it may take twice as long in an English works to handle materials and product.

Metals.

ANSONIA
BRASS & COPPER CO.,
No. 19 Cliff Street,
Phelps Building, NEW YORK.
MANUFACTURERS OF
BRASS AND COPPER
Sheets, Bolts, Rods, Wire, &c.
Seamless Brass & Copper Tubing.
Ansonia Corrugated Stove Platforms.
PURE COPPER WIRE
For Electrical Purposes, Bare and Covered.
Phosphor Bronze Rods for Pumps, &c.
ANSONIA ★ REFINED
INGOT COPPER.

PHELPS, DODGE & CO.
IMPORTERS OF
TIN PLATE,
ROOFING PLATE,
Sheet Iron, Copper, Pig Tin, Wire, Zinc, &c.
MANUFACTURERS OF
COPPER AND BRASS.
CLIFF STREET, NEW YORK.

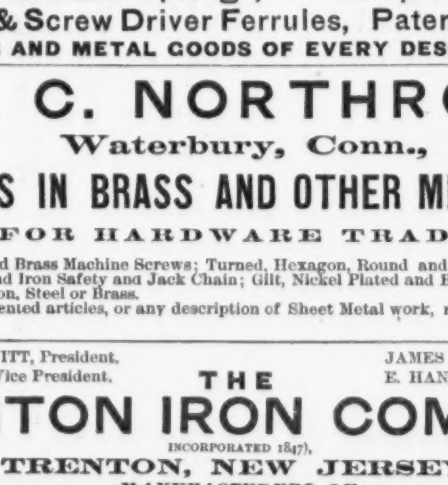
SCOVILL MFG CO
BRASS,
HINGES, WIRE, GERMAN SILVER.
PHOTOGRAPHIC GOODS.
BUTTONS,
CLOTH AND METAL.
DEPOTS, 419 & 421 Broome St., N. Y. 177 Devonshire St., Boston. 183 Lake St., Chicago.
FACTORIES, Waterbury, Conn. New Haven, Conn. New York City.

DICKERSON, VAN DUSEN & CO.,
Importers of
Tin Plate, Pig Tin, Sheet Iron, Copper, Wire, Zinc, Etc.
29 & 31 Cliff St., cor. Fulton,
DICKERSON & CO., Liverpool. NEW YORK.

Established 1837. Incorporated 1876.
WATERBURY MANUFACTURING CO.,
WATERBURY, CONN.
Brass Machine Screws, Jack and Safety Chain,
Bibb Screws and Springs, Whip Mountings,
Chisel & Screw Driver Ferrules, Patented Articles,
BRASS AND METAL GOODS OF EVERY DESCRIPTION.

A. C. NORTHROP,
Waterbury, Conn.,
NOVELTIES IN BRASS AND OTHER METAL GOODS
FOR HARDWARE TRADE.
Wrought Iron and Brass Machine Screws; Turned, Hexagon, Round and Square Head Cap and Set Screws; Brass and Iron Safety and Jack Chain; Gilt, Nickel Plated and Bronze Trimmings of all kinds, from Sheet Iron, Steel or Brass.
Estimates on patented articles, or any description of Sheet Metal work, respectfully solicited and promptly given.

ABRAM S. HEWITT, President. JAMES HALL, Treasurer.
WM. HEWITT, Vice President. E. HANSON, Secretary.
THE
TRENTON IRON COMPANY,
INCORPORATED 1847,
TRENTON, NEW JERSEY,
MANUFACTURERS OF
IRON and STEEL WIRE
OF ALL GRADES,
BRIGHT, ANNEALED, COPPERED, TINNED AND GALVANIZED;
Iron and Steel Wire Rods;
EXTRA QUALITIES OF BAR IRON AND RODS.
Best Qualities of Gun-Screw and Charcoal Iron Wire;
Crucible, Siemens-Martin and Bessemer Steel Wire.
Wire Straightened and Cut to Lengths.
Represented in New York by COOPER, HEWITT & CO., 17 Burling Slip.

BRODERICK & BASCOM,
MANUFACTURERS OF
IRON WIRE ROPE. STEEL WIRE ROPE.


800 N. Main St. St. Louis, Mo.

Metals.


Waterbury Brass Co.
CAPITAL, - - $400,000.
Sheet, Roll and Platers' Brass,
GERMAN SILVER,
Copper, Brass and German Silver Wire,
BRASS AND COPPER TUBING,
COPPER RIVETS & BURS,
BRASS KETTLES,
Door Rail, Brass Tags,
PERCUSSION CAPS,
POWDER FLASKS,
Metallic Eyelets, Shot Pouches, Tape Measures, &c.
And small Brass Wares of every Description.
Cartridge Metal in Sheets or Shells a Specialty.
Sole Agents for the
Capewell Mfg. Co.'s Line of Sporting Goods and Wood's Paper Shot Shells.
DEPOTS: 296 Broadway, New York, 189 Eddy St., Providence, R. I.
Mills At WATERBURY, Conn.

Manhattan Brass Co.,
Manufacturers of
Sheet Brass, Brass Wire, Copper Wire, Copper Rivets, Brass Tubing, Zinc Tubing,
Olmsted Patent Oilers, Prior Patent Oilers, Broughton Patent Oilers, Brass, Tin & Zinc Oilers, Brass Butt Hinges, Hurricane Lanterns,
Brown's Patent Picture Hooks.
Fire Sets, Fenders, &c.
BRASS BLANKS AND TUBES
OF EVERY DESCRIPTION TO ORDER.
OFFICE AND WORKS,
1st Ave., 27th to 28th Sts., New York.

THE NEW HAVEN COPPER CO.,
255 Pearl Street, New York.
Manufacturers of and Dealers in
Braziers' & Sheathing COPPER.
Kettle Bottoms, Bolts, Circles, Rivets,
Ingot Copper, Spelter, Solder, &c.

Metals.

The Plume & Atwood Mfg. Company,
MANUFACTURERS OF
SHEET and ROLL BRASS and WIRE,
German Silver and Gilding Metal,
Copper Rivets and Burs,
Kerosene Burners,
Lamp Trimmings, &c.
80 Chambers Street, New York.
13 Federal Street, Boston.
109 Lake Street, Chicago.
Rolling Mill, THOMASTON, Ct. Factories, WATERBURY, Ct.

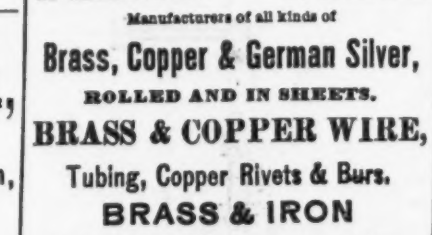
Bridgeport Brass Co.,
MANUFACTURERS OF
Sheet and Roll Brass,
Brass & Copper Wire & Tubing,
German Silver Metal and Wire,
Copper and Iron Rivets.
OILERS and CUSPADORES, LANTERNS and TRIMMINGS, Clocks & Fly Fan Movements.
LAMPS and TRIMMINGS, KEROSENE BURNERS, PLUMBERS' MATERIALS.
Particular attention paid to cutting out Blanks and manufacturing Metal Goods.
MANUFACTORY, *Bridgeport, Conn.* WAREHOUSE, *19 Murray St., N. Y.*

Harrison Wire Company,
ST. LOUIS, MO.
THOS. W. FITCH, Prest. and Treas. CHAS. FISH, Secretary.
MANUFACTURERS OF
All kinds of
IRON & STEEL WIRE
AND
Wire Mill Specialties.

Holmes, Booth & Haydens,
WATERBURY, CONN.
NEW YORK, 49 Chambers St. BOSTON, 18 Federal St.
Manufacturers of all kinds of
Brass, Copper & German Silver,
ROLLED AND IN SHEETS.
BRASS & COPPER WIRE,
Tubing, Copper Rivets & Burs.
BRASS & IRON
JACK CHAIN, DOOR RAIL.
German Silver Spoons.
SILVER PLATED FORKS & SPOONS,
Kerosene Burners, &c.

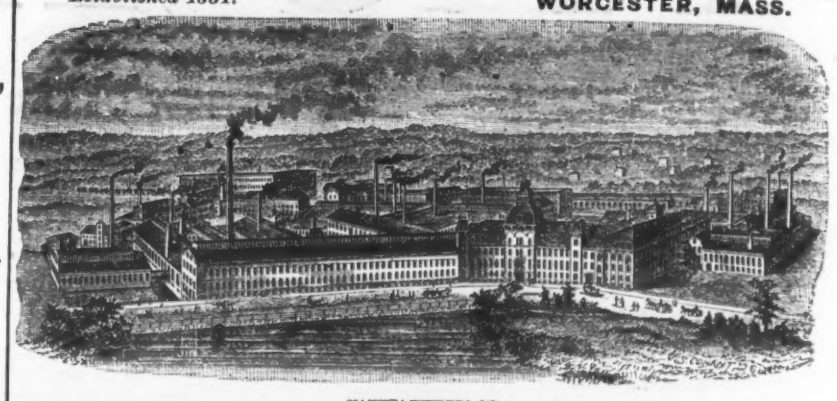
JOHN DAVOL & SONS,
Agents for
Brooklyn Brass and Copper Co.,
Dealers in
Ingot Copper, Spelter, Lead, Tin, Antimony, Solder & Old Metals.
100 John Street, N. Y.

PASSAIC ZINC CO.
Manufacturers of
Pure Spelter
FOR
Cartridge Brass, Gas Fixtures, Bronzes
AND ALL FINE WORK.
Also for
Galvanizers & Brass Founders.
MANNING & SQUIER, Gen'l Agents,
113 Liberty Street, N. Y.

Geo. W. Prentiss & Co.,
HOLYOKE, MASS.,
MANUFACTURERS OF
IRON WIRE.

Bright, Coppered, Annealed and Tin Plated. Also GUN SCREW WIRE.
Of all sizes straightened and cut to order

The Schoenberg Metal Mfg. Co.,
Manufacturers of and Dealers in
SOLDER, TYPE,
Stereotype, Electrotype and Babbitt Metals.
Importers of Block Tin, Antimony, &c. Refiners of Lead, Spelter, &c. Highest price paid for Old Metals and all kinds of Dross. 528 and 530 East 20th Street, between Avenues A & B, New York.

Wire, etc.

PHILIP L. MOEN, President and Treasurer. CHAS. F. WASHBURN, Vice President & Secretary.
WASHBURN & MOEN MANUFACTURING CO.
Established 1831. WORCESTER, MASS.

MANUFACTURERS OF
IRON and STEEL WIRE,
Patent Steel Barb Fencing, Patent Steel Wire Bale Ties.
WIRE RODS of all Grades; Round Iron, Rivet quality, 3-16 in. to ¼ in., cut to any length. Owners and exclusive Operators of the **PATENT CONTINUOUS ROLLING MILL,** producing Iron and Steel WIRE, in coils of 100 pounds, without SEAM or WELD. **Patent Galvanized Telegraph Wire,** Market and Stone Wire, Annealed Fence and Grape Wire in long lengths; Coppered Pail-Ball Wire; Rope, Bridge, Bolt, Screw, Rivet, Buckle and Chain Wire. Wire for the manufacture of Card Clothing, Heddles, Reeds, &c. Piano-string Covering Wire, Tinned Broom Wire and Tinned-plated Wire of all sizes. A specialty is made of Clock, Machinery, Gun Screw and Spiral Spring Wire, and Refined Wire to Pattern for particular purposes, from selected stamps of Norway Iron. Any grade of Wire furnished, Annealed, Bright, Polished, Coppered, Galvanized or Tin Plated. Wire furnished, Straightened and Cut to any length. **Steel Crinoline Wire,** Patent Linen finish. **Unrivaled Steel Music Wire.** Steel Wire for Springs, Needles and Drills. Market Steel Wire kept in stock, all sizes.
WAREHOUSE, 21 Cliff Street, New York. St. Louis Warehouse, 802 North 2d St. Chicago Warehouse, 107 Lake St.

NATIONAL WIRE & LANTERN WORKS, Warehouse, 45 Fulton St., N. Y.
HOWARD & MORSE, Manufacturers of
Brass, Copper and Iron WIRE CLOTH.

No. 1, Star R. R. Lantern. Star Fire Department Lantern. Extra Heavy.
Locomotive Spark Wire Cloth, Iron Wire Bolting Cloth, Ship and Railroad Lanterns, Signal Lights, Conductors' Lanterns, Adjustable Globe Hand Lantern. *Desk and Office Railing,* Riddles, Coal and Sand Screens, Nursery Fenders and Spark Guards. *Ornamental Wire Fence.*

WORKS AT TRENTON, N. J.
ROEBLING'S WIRE ROPE
New York Office AND Warehouse 117 Liberty Street.
THE JOHN A. ROEBLING'S SONS CO.,
MANUFACTURERS OF
WIRE ROPE
OF
Iron, Steel and Copper
FOR
Hoisting Purposes of all kinds, for Ferries, Stays, Ship Rigging, Sash Cords, Lightning Rods, &c., &c. Suspension Bridge Cables.
GALVANIZED
Telegraph Wire, Market Wire, Vineyard Wire.
Iron and Steel WIRE
FOR
Market Wire, Fence Wire, Bridge Wire, Chain Wire, Buckle Wire, Spring Wire, Rivet Wire, &c., &c.
GALVANIZED WIRE CLOTHES LINES.

IRON AND STEEL WIRE ROPE
For Hoisting, Running & Standing Ropes, Ferries, &c.
CONSTANTLY KEPT ON HAND.
Address, HAZARD MFG. CO., Wilkesbarre, Luzerne Co., Pa.

FELTEN & GUILLEAUME,
Carlswerk, near Cologne, Germany.
PATENT CRUCIBLE STEEL WIRE,
For Mining and Plow Ropes, Hawsers and Bridge Cables.
SIEMENS-MARTIN AND BESSEMER STEEL WIRE,
Flusseisen, Swedish and German Charcoal Wire.
GALVANIZED TELEGRAPH WIRE
of Charcoal and Swedish Iron and Steel, also with high conductivity, and in long lengths.
GALVANIZED STEEL WIRE,
For Plain, Barb and Strand Fencing, 3, 4 and 7-ply Strand, Staples, &c. Annealed and Oiled Fencing Wire, round and oval.
WIRE ROPE
OF EVERY DESCRIPTION.
TELEGRAPH CABLES.
Contractors to the German and Foreign governments. The oldest house in the branch on the Continent. **Telegraph Address, CARLSWERK, COLOGNE.**
General Agents for U. S. and Canada,
PERKINS & CHOATE, 23 Nassau St., N. Y.

J. WOOL GRISWOLD,
Manufacturer of
WIRE,
TROY, N. Y.

WIRE RAILING
AND
Ornamental Wire Works.
DUFUR & CO.,
No. 36 North Howard St., Baltimore.
Manufacture WIRE RAILING for Cemeteries, Balconies, &c. Sleeves, Fenders, Cages, Sand and Coal Screens, Woven Wire, Iron Bedsteads Chairs Settees, &c.

platforms must be removed. Then the traveler is placed exactly centrally over the converter, ponderous chains are made fast, the mass is raised high enough to clear surrounding parts, and drawn laterally to the repair shed; then the converter is placed centrally over its seats and lowered and steadied (as it swings from a chain) into its pillow blocks. The repaired converter is raised, traversed and set in place by repeating all these operations; the blast connection is then made, and the pillow-block caps are lifted, traversed, steadied into place and screwed down. If the converter is removed in sections, transferring each section and making the refractory joints will occupy much more time. The chimneys and the openings in the side of the building must be high enough to make passage not only for the traveler, but for the converter when lifted out of its seat, and for the chains that sustain it. A traveler of the required power, hight and length is obviously a ponderous and costly structure, and to work reasonable speed it must have independent steam power—the hydraulic system of the works cannot well reach it.

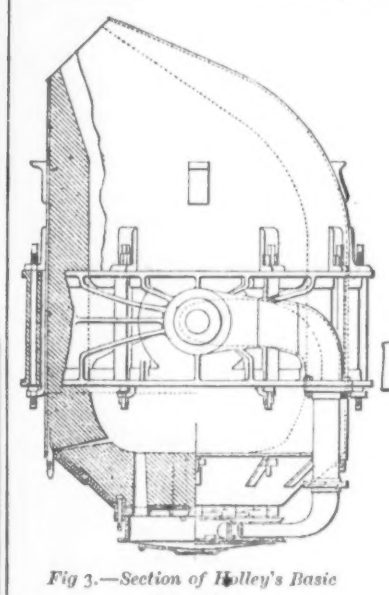


Fig 3.—Section of Holley's Basic Converter.

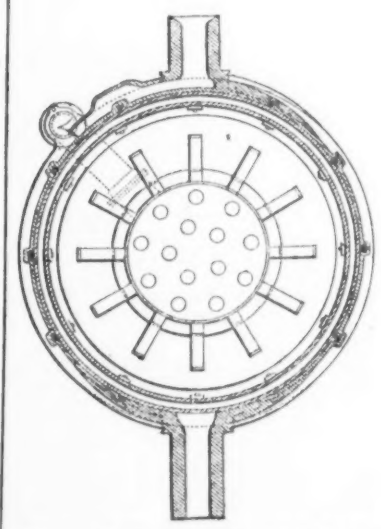


Fig. 4.—Horizontal Section of Holley's Basic Converter.

The method of replacing the lining proposed by the author, and shown in the engravings, is removing only the shell of the converter; lowering it out of the trunnion ring easily and rapidly, by means of a simple lift and car, and replacing a repaired shell by the same means. No pillow block caps, blast connections, nor other surrounding parts are touched; a dozen cotters are knocked out, the shell is lowered and run straight back to the repair shed, the new shell is run in, lifted and cottered on; this is all. The machinery and transference are on the general level, and not 40 feet or more up in the air. The car may be moved by a small reversing engine or by a hydraulic capstan, by means of a wire rope and sheaves suitably arranged. The car runs against a stop, and the lift is perfectly vertical, so that the shell may be put in place by two rapid motions without the delay of adjustment.

The lining may be heated before the shell is put in place, and bottoms (and tuyeres) may be separately removed, as at present, or they may be taken away with the shell and repaired without removal from it. In the latter case, the shell must be placed in trunnions, in the repair shed, so that the bottom may be turned downward for repairs. But if the bottom is first removed, the shell need not be placed in trunnions in the repair shed; the shell will stand mouth downward on the car, a position most favorable for repairing both the mouth and the lining about the tuyeres, which are the two places chiefly needing repairs. This is doubtless the better plan, and it saves the cost of supplementary trunnion rings and turning gear. The engravings show the converter hung so high above the general level that the bottom and tuyere box can be hauled out, with the shell, under the trunnion ring. In case the bottom is previously removed, the converter may be hung some 3 feet lower.

It has been remarked that in American works converter bottoms are changed so rapidly that one is always ready, even when tuyeres stand but 8 or 10 operations. Changing converter shells is much more rapid than changing bottoms. The several operations of removal and transportation are the same, but the converter lining must be trimmed out to receive the new bottom, and a refractory joint must be made. The new shell has merely to be cottered on.

The comparative cheapness of apparatus to change the shell, instead of the entire converter, is obvious. The two hydraulic lifts for removing the bottoms are made heavier, and there are several cars of simple construction; this is the entire apparatus. The increased cost of the converters is not important. In the other case, the traveller with its engine, and the standards and turning gear in the repair shed, and the trunnion rings and pinions (the chief cost of the converters) for each spare shell, approach in expense that of a duplicate plant complete.

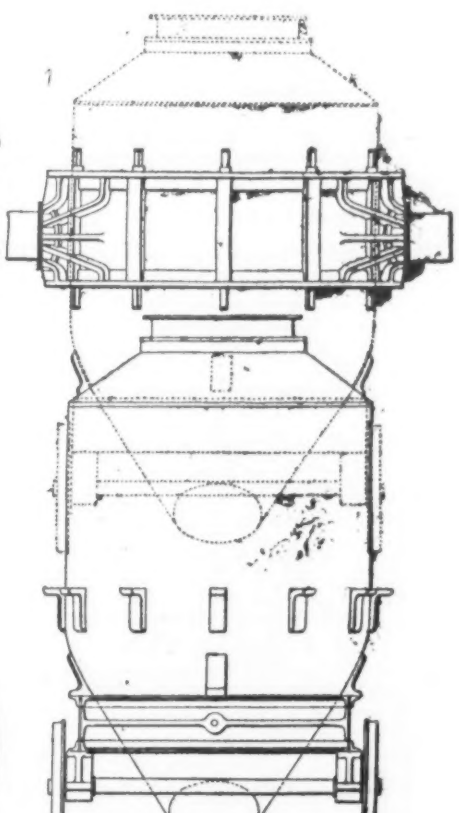


Fig. 5.—Position of the Converter Shell on the Car.

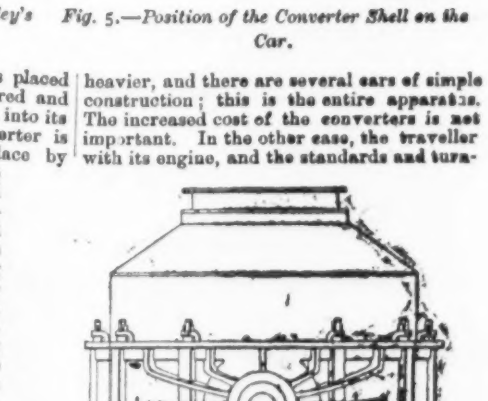


Fig. 6.—Position of Converter Shell Ready for Removal.

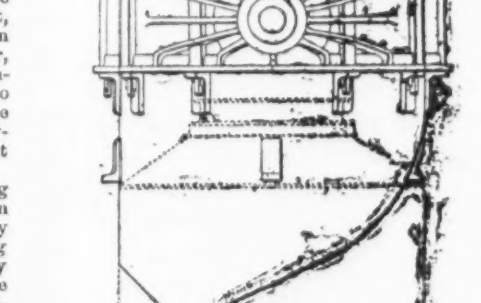


Fig. 7.—Plan of Car.

But one objection has been raised, to

Iron.

NEW YORK.

OGDEN & WALLACE,
Successors to GAM'L G. SMITH & CO.,
IRON & STEEL,
85, 87, 89 & 91 ELM ST., N. Y.
AGENTS
MIDVALE STEEL WORKS.
A full assortment constantly on hand of
Cast, Machinery, Tool, Spring, Tire, Sleigh Shoe, Toe Calk, Plow and Blister Steel.
Orders solicited for
Steel Tyres and Axles,
Steel Forgings and Castings.

PIERSON & CO.,
24 & 26 Broadway, 77 & 79 New St.,
NEW YORK CITY.
"PICKS" of all kinds,
"ESOPUS" HORSE SHOE IRON,
BEAMS, ANGLES,
Tees, Channels, Sheets, Plates.
All descriptions in stock.
IRON & STEEL.

ABEEL BROTHERS,
[Established 1765 by ABEEL & BYVANCK.
Iron Merchants,
190 South Street and 365 Water, N. Y.
ULSTER IRON
A full assortment of all sizes constantly on hand.
Refined Iron,
Horse-Shoe Iron,
Common Iron,
Band, Hoop and Scroll Iron,
Sheet Iron,
Norway Nail Rods,
Norway Shapes,
Cast, Spring and Tire Steel, etc.

A. R. Whitney,
Manufacturer of and Dealer in
IRON,
50, 58 & 60 Hudson,
48, 50 & 52 Thomas, and
12, 14 & 16 Worth Sts.,
} NEW YORK.
Our specialty is in
Manufacturing Iron Used in the Construction of Fire-Proof Buildings, Bridges, &c.
Plans and estimates furnished, and contracts made for erecting Iron Structures of every description. Books containing cuts of all Iron made sent on application by mail.
Sample pieces at office. Please address
58 Hudson Street.

BORDEN & LOVELL,
Commission Merchants
70 & 71 West St.,
Wm. Borden, L. N. Lovell, — New York.
Agents for the sale of
Fall River Iron Co.'s Nails, Bands, Hoops & Rods.
AND
Borden Mining Company's Cumberland Coals.

WILLIAM H. WALLACE & CO.,
IRON MERCHANTS
Cor. Albany & Washington Sts.,
NEW YORK CITY.
M. H. WALLACE. WM. BISPHAM.

B. F. JUDSON,
Importer of and Dealer in
SCOTCH AND AMERICAN
Pig Iron,
Wrought & Cast Scrap Iron,
OLD METALS.
457 & 459 Water St., 233 & 235 South St., } NEW YORK.

DANIEL F. COONEY,
(Late of and Successor to Jas. H. Heidane & Co.)
88 Washington St., N. Y.
BOILER PLATES and SHEET IRON,
LAP WELDED BOILER FLUES,
Boiler Rivets, Angle & T Iron, Cut Nails & Spikes.
Agency for Pottstown Iron Co., Viaduct Iron Works, Lebanon Rolling Mills, Pine Iron Works, Laurel Iron Works, The Bergen Rolling Mills, at Jersey City.

P. W. GALLAUDET,
Banker and Note Broker,
No 3 and 5 Wall Street,
NEW YORK.
HARDWARE, METAL, IRON RUBBER, SHOE, PAPER AND PAPER-HANGINGS, LUMBER, COAL AND RAILROAD PAPER WANTED.
ADVANCES MADE ON BUSINESSS PAPER AND OTHER SECURITIES.

BATES & DESPARD,
117 Pearl St., New York, P. O. Box 764.
Importers of
STEEL AND IRON RAILS, SWEDISH BARS, STEEL AND PIG IRON.
SCRAP IRON and OLD RAILS c. f. and i. to America, or f. o. b. English ports.

Iron.

NEW YORK.

A. B. Warner & Son,
IRON MERCHANTS,
28 & 29 West and 52 Washington Sts.
BOILER PLATE,
Boiler Tubes, Angle, Tee & Girder Iron, Boiler and Tank Rivets.
Sole Agents for the celebrated
"Eureka," Pennocks,
"Wawasset," Lukens,
Brands of Iron. Also all descriptions of Plate, Sheet, and Gasometer Iron. Special attention to Locomotive Iron. Fire Box Iron a specialty.

ROME MERCHANT IRON MILLS,
ROME, N. Y.,
Manufacturers of the best grade of
Bar Iron, Bands and Fine Hoops.
Scrolls, Ovals, Half Ovals, Half Rounds, Hexagon and Horse Shoe Iron. Also from Charcoal Pig a superior quality of Iron branded J. G. All puddled balls reduced by hammer. Orders may be sent to the Mill or to J. O. CARPENTER, our Agent, at 39 Joan Street, New York.

MARSHALL LEFFERTS,
90 Beekman St., New York City,
MANUFACTURER AND DEALER.
Galvanized Sheet Iron,
1st and 2d Qualities.
Galvanized Wire, Telegraph and Fence; Galvanized Hoop and Band Iron, Galvanized Rod and Bar Iron, Galvanized Nails, Galvanized Chain, Galvanized Iron Pipe.
CORRUGATED SHEET IRON
For Roofing, &c., Galvanized, Plain or Painted.
Best Charcoal, Best Refined and Common
SHEET IRON.
Plate and Tank Iron,
C No. 1, C H No. 1, C H No. 1 Flange, Best Flange, Best Flange Fire Box, Circles.
BOILER IRON
Stamped and Guaranteed.
All descriptions of Iron Work Galvanized or Tinned to order.
Price list and quotations sent upon application.

W. BAILEY LANG,
Sole Agent in United States & Canada for
LOW-MOOR
IRON COMPANY,
NO. 50 BEEKMAN ST., NEW YORK.

JAMES WILLIAMSON & CO.,
SCOTCH AND AMERICAN
PIG IRON,
No. 69 Wall St., New York.

ULSTER IRON WORKS,
18 Wall St., New York.

Tuckerman, Mulligan & Co

Passaic Rolling Mill Co.,
PATERSON, N. J.
Iron Bridge Builders
And Manufacturers of
Beams, Channels, Angles,
TEES,
Merchant Iron, &c., &c.
New York Office, Room 45, Astor House.
WATTS COOKE, President.
W. O. FAYERWEATHER, Treasurer.

CARMICHAEL & EMMENS,
130, 132 & 134 Cedar Street, New York.
DEALERS IN
IRON AND STEEL BOILER PLATE
Lap-Welded Boiler Tubes, &c., &c.
Agent for Otis' celebrated Cast Steel Boiler Plates, The Coatesville Iron Co., Pottstown Iron Co., The Laurel Rolling Mills, and Union Tube Works; Wrought Iron Beams, Angles, Tees, Rivets, &c.

HUGH W. ADAMS,
DEALER IN
FOREIGN AND AMERICAN
RAILWAY, PIG AND SCRAP IRON.
Estimates furnished for all kinds of Iron Work.
56 PINE STREET,
D. L. COBB. NEW YORK.

S. A. LISSBERGER,
IRON & METAL DEALER,
509, 511 and 519 to 529 East 19th St., New York,
have on hand, and offer for sale, the following:
Scotch and American Pig Iron, Wrought, Cast and Machinery Scrap Iron, Car Wheels, Axles and Heavy Wrought Iron; also, old Copper, Composition, Brass, Lead, Pewter, Zinc, &c.

Iron.

NEW YORK.

John W. Quincy,
98 William Street, New York.
Anthracite & Charcoal Pig Irons,
Wrought Scrap, Cut Nails, Copper,
BLOCK TIN, LEAD, SPELTER, ANTIMONY, NICKEL, &c

HARRISON & GILLOON
IRON AND METAL DEALERS,
558, 560, 562 WATER ST., and 302, 304, 306 CHERRY ST.,
NEW YORK,
have on hand, and offer for sale, the following:
Scotch and American Pig Iron, Wrought, Cast and Machinery Scrap Iron, Car-Wheels, Axles and Heavy Wrought Iron; also old Copper, Composition, Brass, Lead, Pewter, Zinc, &c.

OXFORD IRON CO.,
(B. G. CLARKE, Receiver,)
Cut Nails
AND
SPIKES.
J. S. SCRANTON, Sales Agent,
81, 83 and 85 Washington Street,
NEW YORK.

BURDEN'S
HORSE SHOES.
"Burden Best"
Iron
Boiler Rivets.
Burden Iron Works, H. Burden & Sons,
Troy, N. Y.

ULSTER
AND
BURDEN'S
H. B. & S. Bar Iron.
Also Best Grades of
American & English Refined Iron.
All sizes and shapes in stock.
EGLESTON BROS. & CO.,
166 South St., 267 Front St., } NEW YORK CITY.

DAN'L W. RICHARDS. MORTON B. SMITH.
DAN'L W. RICHARDS & CO.,
Pig Iron and Bar Iron,
Scrap Iron, Scrap Steel,
Old Rails and Old Metals,
88 to 96 Mangin St., New York.

W. S. MIDDLETON,
Broker in Machinery & Iron
Agent for
FORSTER'S CRUSHER & PULVERIZER,
The best in market.
W. S. MIDDLETON, 52 John St., N. Y.

Glengarnock and Carnbroe
SCOTCH PIG IRON.
For spot delivery and for prompt or forward shipments to New York, Boston, Philadelphia, Baltimore or New Orleans.
For sale in lots to suit by
JAMES LEE & CO.,
Sole Agents for the United States,
72 Pine Street, New York.

CUT NAILS
Hot Pressed Nuts, Bolts, Washers, &c.
FULLER BROTHERS & CO.,
139 Greenwich Street, New York.

Iron.

PITTSBURGH.

W. D. WOOD & CO.'S

PATENT
Planished Sheet Iron.
Patented March 14th, 1865; April 8th, 1873; Sept. 9th, 1873; Oct. 6th, 1874; Jan. 11, 1876.
Guaranteed fully equal in all respects to the
IMPORTED RUSSIA IRON,
and at a much less price.
FOR SALE,
by all the principal
METAL DEALERS
In the Large cities throughout
THE UNITED STATES.
And at their Office,
111 Water Street, PITTSBURGH, PA.

C. A. von Bonnhorst. R. A. Wilson.
R. A. WILSON & CO.,
PIG IRON,
Iron and Steel Rails, All Sizes,
BLOOMS AND ORE,
88 Fourth ave., cor. Wood st., Pittsburgh.

John I. Williams. Henry M. Long. Nathan M. McDowell.
Keystone Rolling Mill,
Williams, Long & McDowell,
Manufacturers of
Merchant Bar and Skelp Iron,
Sheets and Plates of all sizes,
Office, No. 87 Water Street,
Pittsburgh, Pa.
Mill at Soho, Second Avenue.

CHAS. G. LUNDELL,
No. 7 Exchange Place,
BOSTON,
Mass.
SWEDISH IRON
REPRESENTING
Ekman & Co.
GOTHENBURG,
SWEDEN.
Agency of
N. M. HÖGLUND'S SONS & CO., Stockholm.
Swedish & Norway Iron
of every description. Stock on hand at Boston, New York and Philadelphia. Importation orders a specialty.
GUSTAF LUNDBERG, 38 Kilby st., Boston.
ALBERT POTTS, Philadelphia Agent, 234 & 236 N. Front Street.

Iron.

PITTSBURGH.

A. G. HATRY,
Commission Merchant.
Bar, Sheet, Tank, Boiler, Angle, T, and Railroad Iron,
And Railroad Equipment.
Nails & Spikes Steel & R. R. Supplies.
WINDOW GLASS, GAS PIPE & BORAX.
PITTSBURGH, PA.

JUNIATA

SNOW SHOES.
The only Snow Shoes in the market that absolutely prevent all balling and give universal satisfaction.
Improved Snow Shoe Shapes.
Standard Sizes.
⅝x7-16, 11-16x7-16, ¾x7-16, 13-16x7-16, ⅞x7-16, ⅞x1⅛ 15-16x1⅛, 1x1⅛, 1 1-16x1⅛, 1 1-8x1⅛.
STEEL TOE CALKS.
SHOENBERGER & CO., Pittsburgh, Pa.

C. KANE,
OLD RAILS, SCRAP IRON, STEEL,
PIG IRON, BLOOMS,
AND ORE.
PITTSBURGH, PA.

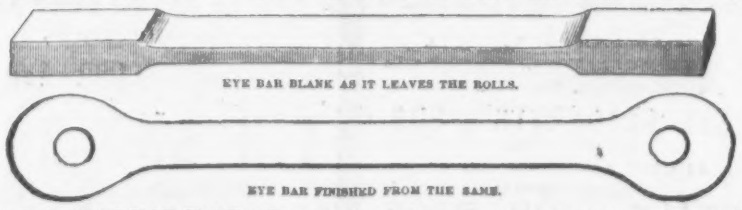
Portsmouth Iron and Steel Co.,
Successors to
GAYLORD ROLLING MILL CO.,
Manufacturers of
Siemens-Martin (Open Hearth)
STEEL BOILER PLATE,
Agricultural and Machinery Steel and Steel Tire.
Also, Homogeneous Iron Boiler Plate and Rivets, Merchant Bar, Hoop and Sheet Iron, Wrought Spikes, Fish Bars and Bolts.
Office and Works:
PORTSMOUTH, OHIO.
J. C. LEWIS, Pres't and Gen'l Sup't. GEO. S. LEWIS, Sec'y and Treas.

St. Louis Malleable Iron Company,
2116 MARKET STREET,
ST. LOUIS, MO.
HENRY M. FILLEY, President. JOHN D. FILLEY, Secretary
MANUFACTURERS OF
Malleable and Gray Iron Castings,
GENERAL HARDWARE, &c.

SABLE IRON & NAIL WORKS
Established 1828.
Manufacturers of
Merchant Iron, Universal Mill Iron
and Nails of Superior Quality and Finish.
Orders for odd sizes Iron filled promptly.
ZUG & CO.,
Corner 13th and Etna Streets, PITTSBURGH, PA.

LEECHBURG IRON WORKS.
KIRKPATRICK & CO.,
Manufacturers of all grades of
FINE SHEET IRONS,
(Refined, Cold Rolled, Show Card, Stamping, Tea Tray, Polished, Shovel, Ferrule Iron, &c.)
NATURAL GAS USED AS FUEL.
OFFICE, No. 143 First Ave., Pittsburgh, Pa. *WORKS, Leechburg, Pa.*

ANDREW KLOMAN,
PITTSBURGH, PA.,
MANUFACTURER OF
Steel and Iron Structural Material



Kloman Patent Solid Rolled Eye Bars, finished in Iron or Steel without welding or "upsetting." Universal Mill Plates of Iron or Steel. Steel Rails of all sizes and patterns. Spike Bars. Channel Bars for Thielsen Car Truck. SPECIALTY—Unusual shapes and sizes in Steel or Iron; Angles, Tees and other structural shapes in Iron or Steel.

far as the author is aware, to the plan proposed, and that is the possibility of damage to the lift under the converter, in case the charge should burn through and fall upon it. To avoid such damage, the lift table may be sunk several inches below the pit level and covered with sand. It may be remarked, that lifts under converters are used in nearly all the American works with satisfactory results.

The engravings illustrate the construction and arrangement so fully that little explanation is required. The trunnion ring (Figs. 3 to 6, page 3) is of cast iron, with an inch wrought-iron lining; or it may better be a steel casting, which will not require a lining. There is a 2-inch annular space between the trunnion ring and the converter shell, and the shell is prevented from shifting laterally by means of the wedges shown in Fig. 3. The car is raised by the lift to receive the shell; or the shell may be lowered by means of a fork on the lift passing through the car.

This construction of converters has led the way to a general improvement in the design of the plant. The shells and bottoms may be run out laterally into the converting house, but the space here is insufficient for convenient repairs, and the shells for one converter could not be well got to the other. In order that there may be one common place for repairs, and ample room both for spare shells and spare bottoms, they must be run out in rear of the converters, as shown in Fig. 2 (page 1). If blast furnace metal is brought directly to the converters, this rear space is not otherwise wanted; but if cupolas are placed there, as is usually the case, they must be so arranged that the shells can pass out under them.

But the cupolas (excepting the spiegel cupolas) may best be placed elsewhere; if there are blast furnaces the cupolas may be so arranged near them as to utilize the same system of transportation, hoisting, blowing and hot blast. There should be plenty of spare gas from good furnaces to heat cupola blast. These are very important considerations, regarding both cost of plant and economy of working. And, judging from the experience at many works, the disadvantages of hauling fluid iron some thousands of feet in a railway ladle are less than those due to crowding the melting department and its stock yard and appurtenances, close behind the converters. Fluid iron is hauled from 1 to 2 miles* without chilling; it need usually be hauled but a few hundred feet, and the cost of transporting plant and service should be about the same for the two systems. There are two important advantages in the arrangement shown by the engravings.

1. Placing only the spiegel cupolas, instead of the entire melting department, close behind the converting house, leaves its rear comparatively open to free ventilation, thus cooling not only the space around the converters, but also the casting pit.

2. This arrangement provides ample room for the convenient removal of slag, which in the basic process is very voluminous; one long dumping car placed under both the converter and the ladle catches it all, and as the bottom of the pit is on the general level, the slag is neither handled nor lifted—the car is simply hauled out by the yard locomotive and dumped. Experts well know the cost and inconvenience of breaking up and quenching slag in the pit, and of lifting it out of the pit, and then loading and removing it.

Iron may be got to the converters in a ladle by various means. It may be hauled on the general level to one or more hoists, and run into short spouts or directly into the converter mouths, or it may be drawn up a gradual incline or lifted by a hoist to an elevated railway near the converters, and thence tipped or tapped into them directly or through spouts. The short elevated railway, as shown in Fig. 1 (page 1), has one conspicuous advantage—it is out of the way of all other apparatus and operations; it does not cross railways, nor interfere with any transportation on the general level. This is an important feature when a change is made every 20 to 30 minutes. The ladle is drawn by a locomotive to short, steep spouts leading to the converters; there is no lateral nor hand movement, and hence no delay. A spout leads to each converter, chiefly for the purpose of leaving the space between the converters (where the common spout is usually placed) quite free for the spiegel ladle.

The spiegel cupolas and their appurtenances occupy so little room that they are placed, without interference with other apparatus, very near and above the converters. A railway ladle receives the spiegel from either cupola and tips it directly into the converter, quickly and hence completely, by a short run and without hoisting or lateral movement. It may be weighed in transit, if desired. The wide platform between the converters is at other times free for bringing lime, scrap or other materials to the converter mouths, and these materials are conveniently raised by the cupola hoist.

The floor of the converting house is raised a few feet, so that the pit bottom may be on the general level, for the convenient removal of slag, as before explained. The ground outside of the converting house slopes gradually to the general level. This facilitates the removal of products, and also the drainage.

The plant for repairing shells consists of two turn-tables, some short railways and a shed; also some platforms and a lift for materials. If bottoms are to be removed with the shells, there must also be mounted trunnion rings and turning gear; also a crane, in the shed; but, as before explained, this seems unnecessary. Room is shown for repairing four shells at a time, but the railways may be lengthened to accommodate more. The plant for repairing bottoms consists of short railways and turn-tables, a space of ramming bottoms under a shed and the necessary ovens for drying them; also a crane, which sets the bottoms directly on the oven cars. If ordinary tuyeres are used, fewer ovens are required; if the bottom is all one tuyere, rammed around rods, it must be burned for two or three days, so that more and better ovens are necessary. The repairing department may obviously be arranged in other ways to suit special cases.

* At the Barrow Works it is hauled 2 miles; at Ebbw Vale, some 5 miles.

The average output of the American plant having two 6-ton to 7-ton silica-lined converters in one pit is 100,000 tons of ingots per year. It will doubtless appear that the plant under consideration should produce even more with basic linings, because it has 10-ton converters and means of keeping one of them in constant repair, so that the converting operations may follow one another without interruption.

Recapitulation.—1. The endurance of basic linings is so small that the ordinary system of repairs would reduce the output of an American plant about one-half.

2. The only adequate system of repairs, with existing basic refractory materials, is to remove and replace linings bodily by removing and replacing the vessels containing them.

3. Changing converters, trunnions and all requires very costly apparatus, and much labor and time in disconnecting parts and in making the transference.

4. Changing only the shells of converters (leaving the trunnions and their connections undisturbed) requires only cheap and simple apparatus; and the operation may be performed so quickly that basic linings will give the maximum output of acid linings.

5. Leaving the building open in rear of the converters, instead of placing the melting department there, gives good ventilation and ample space for bottoms and shells to be run out for repairs and for slag to be removed from the pit. The cupolas (excepting the spiegel cupolas) may be placed elsewhere, especially by adjacent blast furnaces; and melted metal may be transported thousands of feet without difficulty.

6. Placing the pit bottom on the general level allows slag to be hauled away directly, without rehandling or lifting. The elevation of the converting house floor thus produced facilitates the removal of products.

7. The metal ladles are brought in behind and above the converters and are discharged by separate spouts, so as to leave the space between the converters open for a short run of the spiegel ladle and of lime and other solid materials to be charged.

8. The spiegel cupolas are placed near and above the converters, so that the metal may be run in quickly and completely, without vertical or lateral movement, by means of a ladle car.

9. The repairing plant is conveniently placed in rear of the converting house, but it may obviously be modified in extent and position to suit local circumstances.

SCIENTIFIC AND TECHNICAL.

The English newspapers contain descriptions of

AN INCLINE RAILWAY

recently opened in Switzerland on the flanks of the Giessbach. In many respects the new line is novel, and some details are of considerable interest. As on Mount Vesuvius, the carriages are hauled by means of a rope running over a pulley and connecting the ascending and descending vehicles, both running on the same trunk line. The funicular system is, however, supplemented by a rack line like that on the Righi, but in another respect it differs from that line in that no mechanical power is employed in working it. The motive power is furnished by water filled at the summit into a receiver fitted to the vehicles, the quantity taken being that necessary at any time to give a sufficient preponderance in weight to the descending vehicle over that ascending, the water being emptied into the lake at the bottom of the mount. The line, and the stock and mode of working it, have been designed and constructed by M. Riggenbach, of Righi fame, and was commenced just two years ago. The line commences at the landing place of the steamboats on the lake of Brienz, and runs in a nearly right line up to the hotel, situated at a distance of 1134 feet and a hight of 305 feet, the gradient ranging from 24 to 32 in 100. Thence the line is straight until it reaches a crossing toward the middle of its length where the two trains, ascending and descending, cross each other by means of curves of 164 feet radii. The gauge is 3.28 feet. The station at the foot is 127 feet above the steamboat pier, and is reached by a covered stairway, passengers' luggage being pushed up by hand in a small wagon on a miniature railway. About half the Giessbach railway is carried on an iron viaduct of five arch spans, with a mean span of 124 feet, and supported on piers from 29 to 42 feet in hight, the rails being fixed direct to the cross-girders. These cross-girders extend about 2 feet beyond the sides of the girders and carry a footway. On the other part of the line the rails are carried on oak sleepers placed directly on the ground, 3 feet 3 inches apart from center to center. The sleepers receive longitudinal support from iron stringers or ties of U-section. They receive further support from the rack rail, which, like the Righi rail, is formed of two angle rails connected by short square bars 1.86 square inches in section, riveted into the angle rails. The crossing, which forms one of the features of the line, operates automatically. The wheels of one vehicle, forming one of the so-called trains have their flanges exterior to the tread, while the flanges of the other vehicle are interior. The rails on the left are continuous, while those on the right are cut so as to leave a space for the wheel flanges. By these means the vehicle with interior flanges arrives in ascending, for example, and leaving the single trunk line common to both vehicles, is directed by the flanges to the right by the flanges rubbing against the left rail. The other vehicle is, on the contrary, directed by the branch which guides its exterior flanges toward the left. In the descent the operation is the same. The rack rail is bifurcated at the crossing and lowered sufficiently to prevent the wheel flange from coming into contact with it. A groove is made in the rail to receive the rope at this crossing place. The rolling stock consists of two carriages and a goods wagon, the latter being always at the station siding for the purpose of the removal of heavy luggage. It is fitted with a windlass and gearing connected with the rack rail. Four men at the windlass raise three tons 164 feet in the hour with it. The carriages have each six compartments, one for baggage, and the others each contain eight seats, placed transverserly in pairs, each pair above the other like stairs. The water vessels are placed under the platform, at the front end of which, extended, is the place for the driver, who can there command both the brake and the water outlet. The carriages have six wheels, the front pair of which is fixed to the axle and controlled by a brake, the rack line pinion being on the same axle. The other wheels are also fitted with brakes. Besides these brakes, which are operated by screws, the draw hook supports a weighted lever. So long as the hauling tension is on the rope, the hook is held up; but when the tension ceases, as by the rupture of the rope, the lever drops under the weight and the hook immediately engages with the rack. The rope consists of five tresses of steel wire covering a body of hemp; it is capable of resisting without rupture a strain of 20 tons, which is six times that which ought to be brought on it in its work. The water used is collected in a reservoir at the top of the line from the Giessbach, and the carriage on reaching the top stops close to the tank, so that the driver can fill the receiver without quitting the the platform. On reaching the bottom of the line the water is automatically emptied. The wagons weigh 6 tons empty, and at most 9 tons with forty passengers. An excess weight on the decending car of about 1.28 tons of water is required. The ascent or the decent occupies six minutes, and the different manœuvres about four minutes, so that the trains may follow each other at ten-minute intervals. The velocity on the gradients is 3.28 feet per second.

Now that it is becoming more and more popular, it is proper to speak of

THE DANGERS OF THE ELECTRIC LIGHT.

Ladies who value their complexion should not approach an open light of any considerable power too closely, or expose themselves to it for any length of time, as the effect is very likely to be similar to that of walking for hours in a July sun. A more serious danger is that which, according to reports from England, cost a man on board of the yacht Livadia his life some time ago. He was asked to support an electric lamp temporarily while arrangements were being completed for hoisting it to its position, and by mistake placed his hand in such a position as to divert the current from the candle through his body. He was killed instantaneously. Another source of danger has been pointed out by Mr. James Harrison, superintendent of the Bureau of Surveys of the Board of Fire Underwriters. By inadvertance an electric light wire was dropped upon a telephone wire connecting the office and factory of Messrs. Silcox & Co., between No. 4 and No. 14 Maiden Lane, in this city. The current of the electric light circuit partially passed into the wire of the telephone, and in consequence thereof flames burst forth from the telephone instrument on the wall of the office, producing such an intense heat as to entirely destroy the magnets.

In the *Berichte d. dent chem Gesell.* Herr E. Schöne contends that the presence of

OZONE IN THE ATMOSPHERE

is by no means proven, although it has been shown that hydrogen dioxide is in the air. Iodine potassium paper is entirely unfit for use in determining the presence of ozone, as its coloring is dependent upon the moisture in the air. Thallium paper is not thus influenced. It is prepared by pouring a solution of sulphate of thallium into a boiling solution of barium hydroxide. The solution of thallium thus obtained is used to soak filter paper. According to Schöne's investigations, the intensity of the coloring of this paper by the formation of a brown oxide has corresponded with the percentage of hydrogen dioxide in the air.

Researches have been made recently by R. A. Mees on

THE COMPRESSIBILITY OF WATER.

While Gressi makes the coefficient at 10.8 degrees C. 0.000048, Mees has found it to be 0.00004783 for a range of pressure between 0.5 and 9 atmospheres.

Insurance Against Bad Debts.

The *Ironmonger* says: Nothing in the whole range of business operations is more annoying than a bad debt, to say nothing of the pecuniary losses which are thereby incurred by almost every firm in the course of the year's transactions. Any scheme, therefore, which may be put forward as a means of obviating these losses is sure to command attention and consideration on the part of all who are engaged in mercantile pursuits. The man who would demonstrate the thorough practicability of such a plan would not only deserve the good opinion of his fellow countrymen, but might safely count upon a handsome amount of remuneration for his trouble and skill. We ourselves are by no means convinced that any such idea is likely to be attended with complete success, but the matter is of so much importance to the commercial community in all its many ramifications, that we are bound to encourage every effort which may be made to attain the desired end. Among the most recent of the projects aiming in the direction indicated is that of Mr. John Bland, of Harley street, London, who states that it is now under the consideration of some of the most important insurance companies of England and America. Mr. Bland believes that these companies might make this a very profitable department of their several businesses, besides thus adding to the stability of commerce, and creating additional confidence in all trading transactions. He urges that the percentage of losses arising from bad debts might be divided between the seller, the buyer, and the insurance company, and that all three might reap advantages therefrom. The details elaborated by Mr. Bland are too long for enumeration here, but we may state that, in effect, he advocates the issuing of policies guaranteeing credits up to stated aggregate limits, in consideration of which the companies should from time to time guarantee the payment of accounts of specified amounts, for which accommodation the insurer should pay a premium. The business so created, as it were, might be divided into three classes:

1. When there was no risk whatever;

that is to say, when merchants or traders deposited security above the value of the amount guaranteed.

2. Cases in which there was some risk, by reason of the merchant giving security for only a part of the amount guaranteed.

3. Cases in which there was only the personal security of the merchant.

It is argued that some such practice as this would not only prevent losses and minimise bankruptcies, but would greatly increase international confidence in commercial matters, besides creating a new branch of business, lessening the amount of capital necessary to carry on trade, and obviating the existing necessity for resorting to bill discounting. There is evidently "something in" the plan, but it remains to be proven, first, whether the existing companies are prepared to take it up, and, second, how it would work out under the hard friction of everyday business.

Art Castings at Ilsenburg.

(Concluded.)

QUALITY OF THE IRON.

Art castings in iron require for their successful production a carefully chosen metal, one which must not only possess greater strenth than is required for ordinary castings, but one which, by its density and fluidity in a molten state, is capable of reproducing minute forms with sharpness and exactness. In order to obtain definite information as to the conditions under which suitable iron is produced by the smelting process, the material has, at Ilsenburg, been subjected to careful examination, both when in the fluid state and during the progress of setting and cooling; and these investigations, which have been carried on for more than 30 years, have resulted in the discovery of the facts of which we propose now to speak—facts which are of high interest in themselves, and which appear worthy of the most careful attention of metallurgists.

According to the appearance of the new fracture when broken, pig iron is, and has been for many years, both in this country and abroad, designated by certain numbers, the particular value attached to each number varying, however, in different localities. Speaking broadly, No. 1 signifies a course grained dark-gray iron; Nos. 2 and 3 are finer grained and lighter grays; while beyond these come the "mottled" and "white" pigs. In many foundries in Germany the following scale is adopted: No. 1, largest grained, highly graphitic, gray pig (*Gaares Eisen*); No. 2, gray pig (*Gaarflüssiges Eisen*); No. 3, mottled pig (*halbirtes Eisen*); No. 4, strongly mottled pig (*stark halbirtes Eisen*); No. 5, lamellar pig (*dünngrelles Eisen*); No. 6, dead-white iron (*hochdünnes Eisen*); and No. 7, white pig (*grelles Eisen*). In this classification—which we shall adopt hereafter in speaking of the appearances of different classes of molten iron—Nos. 1 and 2 are varities of gray iron, Nos. 3 and 4 of mottled iron, and Nos. 5, 6, and 7 of white iron.

If, now, an alteration in the working of the blast furnace or of the cupola shows that a change has taken place in the quality of the iron, or if it is desired to secure the success of a particular casting, the following observations may advantageously be made: Let a sample be taken from the iron available, and let it be cast in a semi spherical mold, prepared as for an open—sand casting, but lined with finely-prepared sand, care being taken that the sand is neither too tightly nor too loosely pressed down. For making this simple casting, a small ladle and a straight edge are carefully warmed, and the necessary quantity of iron is then tapped from the furnace or cupola into the ladle, the slag being removed with the heated straight edge. When this has been done the iron is poured as quickly as possiole into the mold, when the heated straight edge is again passed over the iron. Experience has shown that when a furnace is working irregularly the various classes of iron above spoken of are sometimes to be found arranged one over the other, according to their specific gravities, and in procuring a sample, therefore, care should be taken to procure an average of the whole. The metal having been poured as above directed, the following observations should be made:

1. The color of the iron during the casting.

2. The movements which take place upon the surface of the metal immediately after pouring.

3. The state of the iron during and after its setting.

For the various classes of iron above enumerated these appearances will be as follows:

No. 1 *Iron.*—This iron has during the casting a reddish-white color, and after running it remains unagitated, and has the appearance of a crystallized fat, while it presents a frothy surface covered with "kish." Its fracture when cold is dark-gray, coarse grained, glossy, and very soft, but when remelted it gets a finer structure, and becomes suitable for being recast in crucibles for the production of art castings.

Another variety of this iron, during the pouring, has a lighter color than the variety of No. 1 previously mentioned, while, when cast, its surface is covered with a thick, dim skin, which during the experiment slowly separates in one direction in straight lines, showing at the fissures the bright metallic surface. After these movements have lasted some time, the dim skin again entirely unites, while the iron is seen to be still agitated, and commences to show small projections at those points where the division of the skin last occurred. After setting, the iron shows a slightly convex surface, which has a smooth glossy appearance, with here and there a sparkle of graphite.

This iron, when cold, has a dark-gray-glossy fracture, the grains in the latter being the more strongly marked the greater the volume and the strength of the casting. This class of material is well suited for the casting of fine works of art, as, when quickly poured, it fills the molds well and perfectly, possessing at the same time a great amount of softness. When less quickly poured, the separation of "kish" gives to the casting an objectionable appearance, similar to that of the first-mentioned variety after setting.

No. 2 *Iron.*—This iron has during the pouring a dazzling-white color, while the dim skin which forms on the surface does not appear to be so thick as in the case of the class of iron last spoken of. As the iron runs from the ladle, a tearing asunder of this skin and a display of a metallic glare below is observed, the surface at first splitting only in one direction, but fissures subsequently opening up in various directions. These figures may often be traced even after the setting of the iron, they being then formed by projection on the surface. After the fissures on the surface have been drawn together again, the iron, which is still agitated beneath, evolves small bubbles of gas, which force their way to the surface, this being especially the case toward the middle of the mass.

With the exception of the points where projections mark the last fissures in the skin, the surface of this iron, when set, is dim, glossy, and smooth, and its appearance is similar to that of refined metal, this being the case even in the fracture, with the exception of a little lighter color and slightly denser structure. This iron is the best for art castings, as the largest as well as the smallest articles may be safely cast from it, it giving clean and sharply-marked productions, which can be well worked on account of their but slight degree of hardness. If also the blast furnace charges are good and the varieties used in the cupola well chosen, iron of this class shows great flexibility and elasticity.

No. 3, *or Slightly-Mottled Iron.*—This iron has, when poured, a light or white color, the skin being similar to that of the No. 1 iron, but thinner, while at the point where the flowing commences a stronger metallic luster appears on the broken surface. After the pouring has taken place, the iron at first, like that last mentioned, shows fissures in the skin extending in one direction only; but this merely lasts for a short time, a dividing of the lines then taking place, and cruciform fissures being formed for charcoal and star-like fissures for coke iron.

This splitting up of the surface into fissures goes on very rapidly, new figures continually appearing only to disappear again and make room for others, the appearance being altogether a very interesting one, while the backward and forward movement in the material is remarkable. After this state of affairs has lasted some time the evolution of bubbles of gas commences, the bubbles being more numerous and being evolved with greater activity than in the cases formerly noted. During this period a great agitation of the metal occurs, this decreasing gradually until the iron is "dead," when it begins to set. The surface in this case is no longer rounded, but straight, and is covered with a number of small spheres, which show empty hollow spaces, and adhere very strongly to the surface, so that they cannot readily be removed.

The fracture of this iron shows a light color and slightly glossy surface, and is no longer strongly grained. The material is still suitable for art castings, but the objects cast from it should not have thin places, as they could not be worked upon, and would require previous annealing. On account of its great density, however, this iron is well suited for castings which have to be bored or turned, and particularly for those on which polished surfaces have to be got up. The problem is to produce an iron of this kind with the peculiarity of not being inclined to chill; but this can be done by care in charging the furnaces.

No. 4, *Strongly Mottled Iron.*—If the iron is strongly mottled—approaching in character to No. 5—it shows when poured, a brighter appearance and higher metallic luster than that last described. The fissures formed in the surface skin are similar to those of No. 3, but the figures formed are smaller, and the changes take place more rapidly, so that a certain amount of practice is required to enable appearances to be fixed by the eye. The formation of the gas bubbles also is more distinct, and their evolution commences at an earlier stage.

The setting of the iron takes place under conditions similar to those last described, but the surface becomes covered with numerous leaves, covering larger or smaller concavities in the surface of the iron, according to whether the leaves have been formed by the combination of several bubbles or by the adhesion of single ones. The surface is straight, and the fracture has a light, fine-grained appearance. This iron cannot be used for fine art objects, but it may be employed for larger articles, which possess a certain degree of strength.

No. 5, *or Lamellar Iron.*—When poured, this iron (which is scarcely to be regarded as a white pig) shows a light brilliant color, while the luster which accompanies the breaking of the skin is greater than in the varieties previously noted. After pouring, a to-and-fro movement of the fluid metal takes place, but this only lasts a short time, being followed by the formation of stellated figures, which change rapidly, and which are like those sketched above. In this metal the figures are smaller in size than those produced by the classes of iron already spoken of, while the bubbles of gas are more frequent and of larger diameter. These bubbles unite to form the large leaves which, being hollow, cool more quickly than the mass of metal below, thus giving the surface the peculiar appearance of a red-hot mass of iron covered with dark spots, this being especially the case around the circumference, where the cooling takes place earlier. This appearance is not much liked in foundries for fine work, as it signifies an iron suitable for heavy castings only, but especially applicable to some parts of machinery. The fracture of this iron is lighter than that of the earlier numbers, and it shows fine white patches, and a very dense grain.

No. 6, *or "Dead-White" Iron.*—The conditions just described are to be be found, also, to a great extent, in the case of "dead-white" iron; but the formation of the figures is in this case still more rapid, and the fluidity of the iron is of less duration. The size and quantity of the gas bubbles are also considerably increased, as is also the appearance of the dark spots already referred to. The surface, too, when set, is no longer straight, but slightly concave, while, after the opening of the leaves produced by the bubbles of gas, deep holes are seen. The difference in the two classes of iron consists in the latter having not only deep, but also

Cutlery.

FRIEDMANN & LAUTERJUNG,

Manufacturers of

PEN AND POCKET CUTLERY,

Solid Steel Scissors, Shears, Razors, &c.

Sole proprietors of the renowned full concave

"ELECTRIC RAZORS,"

And the celebrated **"ELECTRIC SHEARS."** Nickel Plated Bows.

Agents for the BENGAL RAZORS.

AMERICAN TABLE CUTLERY, BUTCHER KNIVES, &c.

91 Chambers and 73 Reade Sts., N. Y. 423 N. Fifth St., ST. LOUIS, MO.

MERIDEN CUTLERY COMPANY.

The oldest manufacturers of Table Cutlery in America. Exclusive makers of the CELLULOID HANDLE for Table Cutlery. A most beautiful and perfect substitute for Ivory. Also makers of all kinds of TABLE, BUTCHER AND HUNTING KNIVES. Illustrated catalogues with prices sent to the trade on application. SALESROOM, No. 49 Chambers St., N. Y. Address all communications to West Meriden, Conn.

AARON BURKINSHAW, Pepperell, Mass.,

Manufacturer of

PRUNING, BUDDING AND POCKET KNIVES

OF EVERY DESCRIPTION.

My Blades are forged by hand from the best cast steel and warranted. Established 1853.

JOHN WILSON'S CELEBRATED

TRADE MARK.

"FOUR PEPPERCORNS AND A DIAMOND"

GRANTED A D 1766 BY THE CORPORATION OF CUTLERS OF SHEFFIELD AND PROTECTED BY ACT OF PARLIAMENT

REGISTERED ALSO AT WASHINGTON U.S.A. ACCORDING TO ACT OF CONGRESS

ALSO AT LEIPZIG, IN ACCORDANCE WITH THE GERMAN TRADE MARKS' REGISTRATION ACT.

BUTCHERS' KNIVES, BUTCHERS' STEELS, AND SHOE KNIVES.

It having come to the knowledge of JOHN WILSON that Counterfeit Butchers' Knives, purporting to be of his manufacture, are being sold in the United States, he hereby cautions all purchasers of his Knives and Steels to be on the alert against such imposition.

JOHN WILSON also hereby gives Notice, that it is his determination to institute Legal Proceedings against any person or persons who may be detected infringing his Trade Mark.

Every article of JOHN WILSON'S manufacture, bears the Trade Mark, in addition to the Name.

WORKS:—SYCAMORE ST., SHEFFIELD, ENGLAND. Established 1750.

THE MERIT OF

MARTIN'S PATENT CASTER

SECURES STEADILY INCREASING SALES.

GIVE US SAMPLE ORDER AND YOU WILL BE THEIR FAST FRIEND.

Send for Illustrated Catalogue.

PHOENIX CASTER CO.,

Indianapolis, Ind.

Send for Circular and Discounts to the Trade.

Packed Six in a Case. Painted Black.

THE SECURITY BLIND FAST CO.,

Manufacturers of

PAT. BLIND FASTS, WROUGHT IRON BLIND HINGES, WINDOW SPRINGS

Contracts for Hardware Specialties (wrought and malleable iron) executed promptly.

Correspondence solicited with and estimates furnished to responsible parties.

19 Calender Street, Providence, R. I.

G. W. Bradley's Edge Tools.

Butchers' Cleavers,
Butchers' Choppers,
Axes and Hatchets,
Grub Hoes and Mattocks,
Mill Picks,
Box Chisels and Scrapers,
Ring Bush Hooks,
Ax Eye Bush Hooks,
Socket Bush Hooks,
Watt's Ship Carpenters' Tools,
Carpenters' Drawing Knives,
Coopers' and Turpentine Tools.

FOR SALE BY

MARTIN DOSCHER, Agent, 85 Chambers Street, N. Y.

Cutlery.

ALFRED H. HILDICK,

12 Warren St., N. Y.,

Importer of **CHAINS, ANVILS, VISES, &c.**

Agency of

HILL BROTHERS & CO., WALSALL, ENGLAND

GENERAL HARDWARE MERCHANTS,

And of

BALL'S PAT. SOLID STEEL SHEEP SHEARS.

These shears are unsurpassed for cheapness, durability and utility. They are made of one solid piece of steel from point to point, and cannot be broken in use either in the bow or at the junction of the shank and blade. Samples can be seen at above address, or sample lots furnished.

CORPORATE MARK

Joseph Rodgers & Sons'

(LIMITED)

CELEBRATED CUTLERY,

No. 82 Chambers Street, New York.

P. & W. CLATWORTHY, Agents.

The demand for **Joseph Rodgers & Sons'** productions having considerably increased, they have, in order to meet it, greatly extended their Manufacturing Premises and Steam power.

To distinguish Articles of **Joseph Rodgers & Sons'** Manufacture, please to see that they bear their Corporate Mark.

P. O. Box 3962.

ESTABLISHED 1836.

Alfred Field & Co.,

COMMISSION MERCHANTS,

New York, Birmingham, Sheffield, Liverpool.

Guns and Pocket Cutlery,

SPECIALTIES.

Headquarters for

ELEYS BROS.' GOODS, WRIGHT'S ANVILS,
WILSON'S BUTCHER KNIVES, &c.
WOSTENHOLM'S POCKET CUTLERY AND RAZORS,
FIELD, FRASER & CONTINENTAL POCKET KNIVES,
BUTCHER'S FILES, TOOLS AND RAZORS,
JOSEPH ELLIOTT'S CELEBRATED RAZORS,
WESTERN FILE CO.'S FILES,
ENGLISH AND GERMAN GUNS,
ROBERT SORBY & SONS' SHEEP SHEARS,
STUBS' FILES, WESTERN FILES,
GREAVES' SHEEP SHEARS,
CHESTERMAN'S TAPES,
GERMAN COIL AND HALTERS and other CHAINS,
BRADES' TROWELS AND HOES,
CANASTOTA KNIFE CO.'S POCKET KNIVES,
Etc., Etc., Etc., Etc.

All sorts of Hardware and Merchandise for import and export purchased on commission.

ROBERT SORBY & SONS,

SHEFFIELD,

MANUFACTURERS OF THE CELEBRATED

Kangaroo Sheep Shears,

The best Shears made.

Every Shears Guaranteed.

ALFRED FIELD & CO.,

93 Chambers St., - NEW YORK,

SOLE AGENTS.

Send for price list and terms.

BOLSTER SPRINGS FOR FARM WAGONS.

Made of Best Oil Tempered Steel.

SOMETHING NEW!

They save largely from wear and tear in every part of the Wagon. They remove all necessity for a Spring Seat. They convert a common Lumber Wagon into a Spring Wagon, making it equally comfortable for from one to twenty persons. They are admirably adapted to the wants of Fruit and Vegetable Growers. They are suited to all makes and sizes of Farm Wagons, and can be attached by any one. They make the cheapest and easiest riding Spring Wagon in the market. These Springs have been in practical use for over three years, and are a pronounced success. No Teamster or Farmer can afford to be without them.

We want Agents everywhere. Send for description and prices, and mention this paper.

SEMPLE & BIRGE MFG. CO., St. Louis, Mo.

J. STEVENS & CO.,

Chicopee Falls, Mass., P. O. Box 224,

Manufacturers of

SPRING CALIPERS & DIVIDERS.

Also, surface Gauges and Counter Sinks, Stevens' Patent Breech-Loading Sporting Rifles, double and single barrel; Shot Guns, Pocket Rifles, Pocket Pistols, and the noted Hunters' Pet Rifles. Our Shooting Gallery Rifle is the favorite everywhere.

We make Till either for Coin or Script.

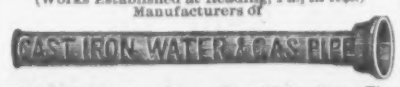
WILLIAM H. AINEY, Chairman. PETER D. WANNER, Sec. and Treas.

Mellert Foundry & Machine Co.,

Limited.

(Works Established at Reading, Pa., in 1848.)

Manufacturers of



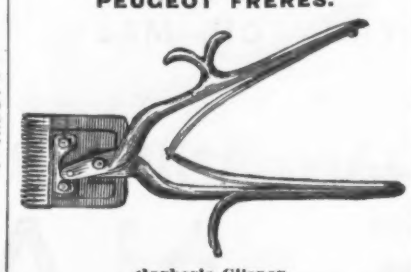
With special Castings, Flange Pipe, Water Gates, Fire Hydrants, Lamp Posts, &c. **The Improved Canadian Turbine Water Wheel.** Machinery and Castings of every description for Furnaces, Rolling Mills, Grist and Saw Mills, Mining Pumps, Hoists, &c. Columns, Brackets, Iron Railings, &c.

ARNOLD MELLERT, Supt., Reading, Pa.

Cutlery.

French Clippers

PEUGEOT FRERES.



Barber's Clipper.

We are sole agents for these Clippers. All orders should be addressed to us to obtain lowest prices.

McCOY & SANDERS,

132 Duane St., New York.

Horse Clipper.

Silver Medal, 1878—Paris.

J. R. SPENCER & SON,

Albion Steel Works, Sheffield,

MANUFACTURERS OF

FILES

AND

STEEL,

Table Knives, Razors, Shovels, &c., &c., of every description.

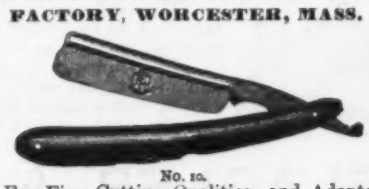
CORPORATE MARK.

SPENCER SHEFFIELD

Granted 1749.

J. R. TORREY RAZOR CO.,

FACTORY, WORCESTER, MASS.



No. 10.

For Fine Cutting Qualities, and Adaptation to all Beards, our

RAZORS

Have no equal.

Price Lists on application.

THE SLAYTON RAZOR.

PERFECTION For Portability. For Cutting Quality. For Temper.

Handles of German Silver, Nickel Plated. Blades of the Finest Steel in the World. Every Razor Fully Warranted.

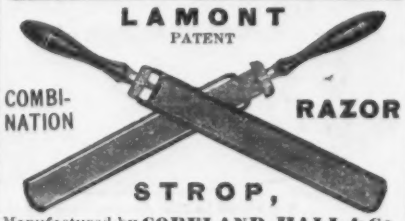
L. C. TOWER, Thermometer Manufr.,

39 Exchange St., Rochester, N. Y., Sole Agent.

Canvassers wanted. Sample by mail, $1.

LAMONT PATENT

COMBINATION RAZOR STROP,



Manufactured by **COPELAND, HALL & Co.**

Rochester, N. Y.

Coulter, Flagler & Co., Sole New York City Agents.

RIEHLE BROTHERS,

50 S. 4th St., Philadelphia.

Improved Power & Hand

SAND SIFTER.

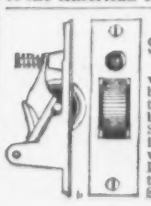
Every foundry should have one. *Send for Prices.* A liberal discount to dealers.

TELESCOPE TUBES.

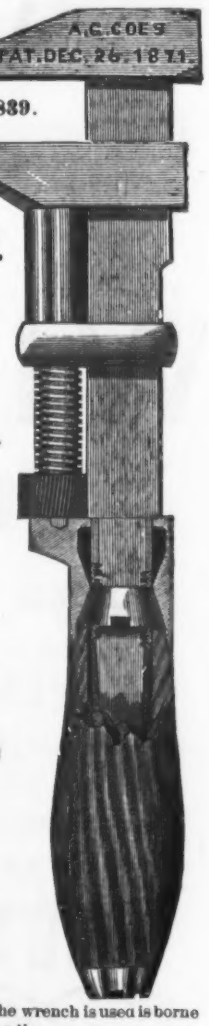
Fine Mandrel-drawn Tubes, from Brass or German Silver. Tubes for sliding one within the other made to order. Manufactured by ROBT. T. DEAKIN & CO., 500 N. 12th St., Philadelphia, makers of the American Improved Brass Garden Syringe.

THE PATENT

SCREW WINDOW BALANCE



With which the Sashes work as with weights, their application being at an expense of one-half the cost of applied weights, no boxings being required. The Sashes are Locked with the meeting rail lock. Stands alone in its working. Price $1 per set (four.) Discount to the trade. In use over three years. Robt. B. Hugunin, Sole Maker, Hartford, Ct., U. S. A.



Established in 1839.

A. G. COES & CO.

WORCESTER,

MASS.,

Successors to

L. & A. G. Coes,

Manufacturers of

THE GENUINE

COES

Screw Wrenches.

PATENTED,

May 9, 1871.
December 26, 1871.
December 28, 1875.
August 1, 1876.

The backstrain when the wrench is used is borne by the bar—not by the handle.

The strongest Wrench made, and the only successful Re-enforced Bar.

None genuine unless stamped

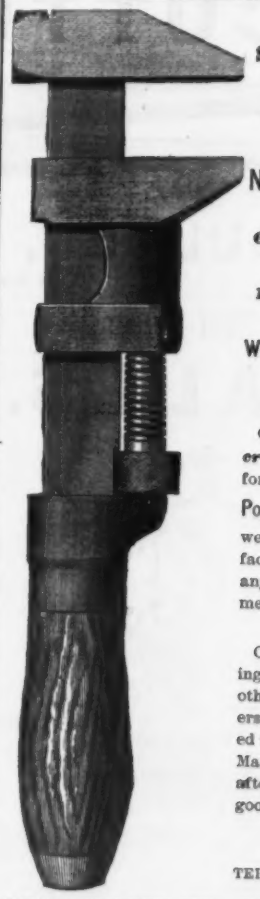
A. G. COES & CO.,

Our Agents, GRAHAM & HAINES, 113 Chambers St., New York, carry a full line of our goods, and will be pleased to serve you at factory prices.

TRADE MARK.

STANDARD GIRARD WRENCH.

WARRANTED.



FOR **STRENGTH** AND **Durability** IT HAS NO SUPERIOR.

GUARANTEED IN EVERY RESPECT.

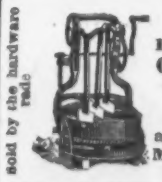
Wrought Bar, Head and Screw.

Owing to the *increased demand* for these justly Popular Wrenches, we are now manufacturing more than any other establishment in the world.

Our Wrench having been imitated by other manufacturers, we have adopted the above Trade Mark, and will hereafter stamp all our goods.

SEND FOR TERMS and PRICES.

GIRARD WRENCH MFG. CO., Girard, Pa.



Sold by the hardware trade

"DRAW CUT"

BUTCHERS' MACHINES.

Choppers, Hand and Power Stuffers, Lard Presses.

Warranted thoroughly made and the BEST IN USE.

MURRAY IRON WORKS, Burlington, Iowa.

GEO. M. EDDY & CO.,

Manufacturers of

Measuring Tapes

Of Cotton, Linen & Steel.

FOR ALL PURPOSES.

351 to 353 Classon Ave., Brooklyn, N. Y.

CHAS. E. LITTLE,

59 Fulton St., New York,

Pump-Log and Tubing Augers and Fittings,

And Agent for

Barnes' Wood-Working Machinery and Lathes.

Clements' Steam Band Saw.

Kimball's Foot-Power Band Saw.

flat holes, the existence of these proving the iron to be of a harder class than the other. The fracture of this metal shows a mixture of white and gray iron, this variety marking the transition to white iron properly so called. If the proportion of gray and white is about equal, the metal is known on the Continent as "Forellen" iron. Such iron is no longer suitable for fine castings, but if produced by a well-selected charging of the furnace, it possesses a very close structure and great strength. This iron is especially suitable for casting large rolls, which gain in strength through their cooling very slowly, and which can be subsequently turned. It is also suitable for the production of chilled castings, of which samples were exhibited at Vienna by the Inneberger Gewerkschaft, of Styria.

No. 7, *White Iron.*—The form of this iron in section when cold is concave. When poured, this iron has a white color, but this very soon changes to red, while the metallic luster is very strong. The splitting or opening up of the skin does not last long, but soon makes room for the formation of large gas bubbles, which may be observed violently agitating the mass. These bubbles burst, and the discharge of gas takes place with such force that fine particles of burning iron are thrown out in all directions. The surface next begins to sink, and soon after a dark skin begins to spread like a shadow over the surface of the still red-hot mass, from the circumference toward the center. Finally this skin becomes lighter and peels off, showing a number of the shallow cavities described above. The fracture of this iron is white, and the metal is too hard to allow of its being worked.

The characteristic appearances of the various sorts of iron depend upon and are intimately connected with the proportions of silicium, manganese, phosphorus, sulphur, &c., which the iron contains. If, for instance, in an otherwise normal state of the iron the contents of sulphur in the latter are proportionately large, the so-called "Bräunen," with the leaving behind of flat holes, may be observed. The shape of the figures due to the fissures in the skin is also altered if an addition of zinc, copper, &c., is made, and, for instance, the addition of tin causes these figures to alter their shape entirely, and gives rise to beautiful formation.

The formation of distinct figures by the division of the surface skin was formerly attributed chiefly to the inclination of the iron toward crystillization, but a closer knowledge of the composition of the iron has shown that the generation of gas dependent on this composition, and accelerated and acting through the presence of the oxygen of the air mixed with the metal by the act of pouring out, must exercise an influence upon the formation; this generation of gas being proved by the bubbles that rise and escape.

The question now is, whether conclusions cannot be drawn beforehand from these observations respecting the composition of the iron, and whether a preliminary determination of the contents of sulphur, phosphorus, carbon, manganese, &c., cannot approximately be made. How important these observations would be for the industry of iron if, as has not so far been the case, they could be connected with chemical analysis, and how much more instructive would they be if microscopic investigations of the crystalline formation could be added. The latter investigations certainly deserve more thorough study than they have hitherto received, a neglect which can only be explained by the difficulty of the observations, the lens necessarily having to be placed close to the surface of the iron that is under examination, and it thus being impossible to obtain a large field of view, a few particles only being in the right focus.

Long and continued study and practical observation on the part of those who have made the treatment of iron in the foundry a specialty, have enabled them to formulate a few rules which may be useful for determining the suitable sort of iron for special classes of art castings.

In iron bars, which show after the setting hollow internal spaces (such as must necessarily be produced in consequence of the setting growing from out to inside, if nothing is done for their prevention), there are to be found in these hollow spaces octahedral crystals more or less beautifully formed, according to the degree of fluidity of the iron. Now, notwithstanding the exact resemblance of the fundamental shape of the crystal, it will be found, if the various samples of iron are compared with each other in this respect, that *one* difference may be observed, namely, the different proportions between longitudinal and cross axes of the crystals. The more beautifully the crystals are shaped, the more clearly is this difference of proportion observable. Very large formations of crystals are often to be seen in the more capacious cavities of large castings, but these are seldom of such pure and delicate forms as those to be found in smaller cavities. If they are completely formed they resemble small fir trees, as octahedral needles at certain distances, forming also an octahedral-like space, and will be found to have arranged themselves around a central axis.

By the aid of a powerful lens a similar appearance is to be found in the surfaces of fractures of iron which are more minutely examined, while even a smaller magnifying power shows the triangular surfaces of the crystals and their proportionately different longitudinal axes.

The same class of crystals is to be found in all kinds of iron and steel, and the similarity is often so great that the assertion might almost be made that cast iron is nothing else but a compound of bar iron crystals and graphite, and that the quality of the cast iron depends upon the proportion and character of the mixture of these components.

Examining now these various sorts of iron, it will be acknowledged that to produce a certain class of castings, the pig iron forming the charges of the cupola or melting furnace should be selected and examined with the same care as the ores for the charges of a blast furnace; but while in the latter case the nature and quality of the ores to be used are thoroughly investigated before being fed into the furnace, the iron for the cupola is but too generally examined only slightly and superficially, and a microscopic examination, which would offer some reliable data, is seldom resorted to. Instead of this, however, the quality of the iron is estimated from the place of its production; and if the nature of a certain brand of iron, supplied by known iron works, has once been ascertained, it is generally taken for granted that all further supplies from the same works will have the same qualities. Where, however (as is generally the case), the charges of the blast furnace are not always the same, the iron produced should be chemically, or at least microscopically, examined before being used in the cupola for the production of castings of a given quality.

It has to be considered that the iron, having become fluid in the higher temperatures of the ordinary cupola, has to pass in its descent through the current of air still saturated with oxygen, that it is subjected to an alteration similar to the fining process, and that it will become white and hard if the formation of graphite has not been reconstituted by the abundance of carbon. In connection with this matter we may mention the cupola furnace invented by Herr Krigar, of Hanover, this furnace being constructed so that the molten iron is withdrawn from contact with the coke and blast, the hearth for receiving the iron being to one side of the furnace and not directly below the crucible as usual. When this furnace has been correctly put up, its use has always been attended with an economy of coke; but this is not its only advantage. A leading feature is the decrease of the danger of producing white and hard iron. Hence, in a furnace on Krigar's system, a larger percentage of coke iron may be added to charcoal iron without producing a white metal than is possible under ordinary circumstances. In fact, in Krigar's furnace a suitable metal for art castings may be obtained by the use of coke iron, although, of course, charcoal iron is always to be preferred.

In support of the opinion that no iron having an inclination to get white should be applied for art castings, we may refer to the fine iron castings exhibited at Vienna by Rastorgonieff, of the Usines de Kischtim, near Perm, in the Ural (Russia), which have been produced by previously submitting the iron used for them to a trial in open sand molds, when it was first determined that the iron would not get white, but would remain gray; if this was not the case it was not used.

It is further certainly erroneous to suppose that a large percentage of phosphorus, which tends to make iron become white, is especially advantageous for art castings; and this opinion is only correct in so far that the normal working of a blast furnace using limonite ores produces an iron free from "kish" or iron froth, and which is of a very fluid nature, penetrating sharply into every form, although it is hard and possesses the necessary strength.

This quality and that of other sorts of iron corresponds exactly with their point of fusion, and many occurrences, often of considerable disadvantage, depend upon it; among the most disadvantageous is, however, that of the so-called burning (*Andrand*) which shows itself by rough or file-like surfaces, which take away from the castings all fineness and exactness, and make them look imperfect and almost useless. A closer examination shows that these rough surfaces have been produced by the accumulation of small projections, which partly cover the castings, and with a certain thickness. This appearance is entirely independent of the molder's work, and if the latter has been executed as carefully as possible, and the best casting might have been expected, the surfaces are, nevertheless, covered with projections and grains. The reason for this can, therefore, only be in the quality of the iron. It has been endeavored to ascertain the reason of this chemically, and it is said to have been discovered that the projections forming the rough surfaces were special compounds of iron and other bodies. This, as will be seen hereafter, is correct; but it alone does not explain the mechanical processes that take place in connection with it.

The iron in a fluid state will be no homogeneous body, but a composition of various compounds between iron and phosphorus, iron and sulphur, iron and manganese, iron and carbon, iron and silicium, &c. Each compound has, however, a certain point of fusion, the one lower than the other. Now in mixtures which differ much with respect to their point of fusion from the iron, one portion of the latter will set while the other portion remains in a fluid state, this latter part being forced by the contraction of the former portion through the pores, which are still open during the red hot state of this portion of the iron, and in this manner the so-called burning or "*Anbrand*" is produced.

A consideration of the facts above stated, showing that it is desirable to possess some simple mode of determining the relative points of fusion of different classes of iron, Mr. Schott, the director of the celebrated Ilsenburg Foundry, some years ago devised the following method, which, although of course only capable of affording approximate results, he has found answer well in practice:

An iron vessel weighing about 50 pounds is filled to a certain hight with water, so that it contains exactly 100 pounds. When fluid iron is poured in, the temperature of the water will increase in proportion to the temperature and the volume of the iron; and this increase of temperature is then applied for determining the relative points of fusion of the various sorts of iron in the following manner:

After having measured the temperature of the water, a portion of fluid iron, as taken from the blast furnace or cupola, is poured into it as quickly as possible. The water is then stirred, when the temperature is again observed. The water is now carefully tapped off, and the iron is taken out, dried, and weighed. The weight is thus obtained which at a certain temperature produced the observed increase of the temperature of the 100 pounds of water. Various degrees of heat will produce various differences of temperature, but as it is not always possible to use equally large quantities of iron, while the results are in proportion to these quantities, the following formula has been found to give the relative weight

for a certain degree of heat of the iron:

Let the quantities of water used in two experiments, carried out in the way above described, be represented by W and w respectively, and let also I and i be the corresponding quantities of iron used; T and t the difference of temperature produced in water, and H and h the quantities of heat imparted to the latter per unit of weight of the iron. Then evidently

$$H : : h = \frac{WT}{I} : : \frac{wt}{i}$$

But the quantity of water is constant, or W = w, therefore

$$H : h = \frac{T}{I} : \frac{t}{i}, \text{ or } H : h = T\,i : t\,I,$$

whence it follows that, if we give the result, H, obtained, in any one instance a certain standard value, the corresponding value of h, derived from another experiment, will be given by the simple formula:

$$h = \frac{H \times t \times I}{T \times i}$$

It is evident that H and h, instead of being expressed in pound degrees of heat given out per unit of weight of iron, may, for practical purposes, be more conveniently expressed by the degrees of temperature representing the respective melting points, and this is really what is done at Ilsenburg, the temperature of 2732° Fahr. being taken as the standard value, while differences of temperature 864° Fahr. have been found. It is to be noted that this mode of estimating relative melting points takes no account of the latent heat set free during the solidifying of the iron, but regards all the heat imparted to the water as if it were merely due to the sensible heat abstracted from the iron during its cooling down from the melting point. No doubt this fact introduces an error, while other errors may be induced by the want of care in pouring the iron into the water just before setting; but these errors do not affect the value of the system as a rough-and-ready practical method of ascertaining the relative fusion points of different samples, and, as we have said, it has been found effective and useful at the Ilsenburg Foundry.

Skinner's Combination Chuck.

The Union Manufacturing Co., New Britain, Conn., and 96 Chambers street, New York City, are making a new "Universal" lathe chuck, which has, in addition to the usual motion of the jaws, both independent and eccentric motions. The jaws are worked in the usual way by means of screw threads. The screws are operated by means of pinions, which gear into a circular rack in the shell. By means of a simple stud at the back, working a cam plate, the pinions may be thrown out of gear, and one or all of the jaws worked independently. The rack is carried by the cam plate or ring, by which it is either forced forward in gear or drawn back free from the pinions. There are circles upon the face of the chuck to aid in setting the jaws true, so that when it is desired to make use of the universal motion it may be done without delay. The construction of these parts is very simple, and, as little room is taken up, the thickness of the chuck from front to back can be reduced to just what is needed for strength. This has the important advantage of reducing the distance from the work to the spindle, and thus diminishing the leverage of the cut upon the spindle itself. This is an important point, since the spindles of lathes are, as a rule, too small for the work needed, and to their springing or yielding is due much of the poor workmanship of the shops.

In order to guard against wear upon the steps of the jaws, and to insure the faces being in the proper plane parallel with the face plate of the lathe, the chuck is constructed with adjusting screws, the heads of which form a rest for the work to be held. They are, of course, flush when the chuck is finished, both head and step being ground at the same time, but they can be raised when from any cause the faces of the jaws are found out of true. These chucks are made with three and four jaws. The sizes kept in stock are 4, 6, 9 and 12 inches, but the 3-jawed chucks are made up to 36 inches in diameter, and the 4-jawed chucks up to 30 inches. The parts are made interchangeable for the same sizes, which is a point of no small advantage in all work of this class, as it enables parts to be replaced with ease when necessary.

Since writing the foregoing the Boston *Journal of Commerce* has come to hand, in which we notice some remarks by Mr. Pemberton upon this chuck, from which we quote as follows:

It seems to be equally solid and reliable as a concentric and simultaneously moving jaw chuck and one of independently moving jaws, and the change from one class or style to another is instantly made, without the use of a wrench and while the chuck is on the spindle. The sliding of a stud by thumb and finger instantly disengages, or throws in gear, the circular rack, and when disengaged one or more of the jaws may be put in position for irregular or eccentric forms, and then locked with the actuating rack, to move simultaneously. And there appears to be nothing in the means of making these changes that is liable to wear out or become inoperative. The hole in the center is of unusually ample size, to allow the chuck to be used on hollow arbors. The slot in the face in which the jaws traverse is large, giving great strength to the jaws. The jaw threads are lathe cut and trued in a master nut. By thorough exactness, insured by jigs for drilling and exact gauges for other parts of the work, the parts are made interchangeable, obviating the expense and waiting of returning the chuck to the works in case of breakage of any portion. The material is selected with care, the drop forgings are carefully inspected, and a system of examinations in every stage of the work seems to assure a perfected article.

Thirteen men were recently precipitated to the bottom of a colliery shaft at Mons, Belgium, and killed by the breaking of the hoisting apparatus.

Joseph Rodgers & Sons, Sheffield.

The *Ironmonger* gives the following brief history of this famous house:

The history of this firm is, to a very marked extent, the history of the cutlery trade of Sheffield. The Rodgers family have been cutlers for at least two centuries. In 1730 the firm consisted of Maurice and Joseph Rodgers, and their place of business was in Hollis Croft. In that year they removed into Sycamore street, but as the business of the firm increased, one lot after another of the adjacent property was purchased by them, until the whole block of buildings skirting Norfolk street, Milk street, Sycamore street and Flat street came into their possession. The premises have been entirely rebuilt, the last additions having been made as recently as 1869. The handsome and imposing frontage is in Norfolk street, and the premises are, without doubt, the most compact and complete in the world. In 1764 the firm received from the Cutlers' Company of Hallamshire their trade-mark—a Maltese cross and star. In 1800 they added to their original trade of penknife cutlers the razor and table-knife branches, and a few years later they commenced the manufacture of scissors. About the year 1821 Messrs. Rodgers & Sons were, by special appointment, made cutlers to the Royal family. Shortly after, a similar honor was conferred upon them by the King of Sweden; and both distinctions they have continued to enjoy.

In 1825 the firm opened a show room for the disposal of their goods—a proceeding which at the time had no precedent in the town. The experiment proved a success, and when the room was required for the purposes of a workshop, two other large rooms were built and opened in 1862. They are very handsomely fitted up, and for a visitor to Sheffield not to inspect Messrs. Rodgers's show rooms, and when there not to make a purchase, is to fail of seeing one of its chief sights and to miss a very great pleasure. Among the articles exhibited in the rooms is a knife containing as many blades and instruments as there are years in the Christian era. They are all perfectly distinct, and no two blades or instruments are alike. Then there is the celebrated "Norfolk" knife, which was shown at the exhibitions of 1851 and 1862, and again at the exhibitions of Paris and New York. On the steel blades are etchings of Her Majesty, the late Prince Consort, and the President of the United States; and also views of Windsor Castle and the other royal residences, of the American White House, of Haddon Hall, Chatsworth House, and other local places of interest. The handle is of carved pearl, representing on one side a boar hunt, and on the other side a stag hunt. The backs of the blades are exquisitely ornamented, and altogether it is one of the most perfect specimens of Sheffield workmanship ever turned out.

The firm have now in their employ about 1700 well-organized and skilled workmen, who turn out, weekly, 5000 dozen of table knives and forks, 1500 pairs of carvers, 1500 dozen of pocket knives, 1200 dozen of razors, and 1200 dozen of scissors. In addition, there is a large number of warehouse people, clerks, and so forth employed. The firm have offices and warehouses in Cullum street, Fenchurch street, London; and also in New York, Montreal, Toronto and New Orleans. The principal markets for their goods are the United States, India, South America, Canada, Australia, South Africa and West Indies, but they have a large home trade as well—in short, their productions find their way to all markets. Our readers will understand something of the magnitude of their trade with America when it is stated that in the last week of 1870 they sent to that country alone upwards of 10 tons weight of finished cutlery. The founders of the firm have long since passed away, as have also their sons, the last of whom, Mr. Joseph Rodgers, died in December, 1867, at the ripe age of 83. There remains only one grandson, who, together with Mr. Newbold, constituted the firm. The concern has been converted into a limited liability company, with a capital of £130,000, in shares of £100, and the fact that the subscription was privately filled in a few hours shows how fully the house enjoys the confidence of the public.

Since 1871 the business has considerably extended, and the premises then taken do not suffice by far for the requirements of the firm, who have now two branch establishments for manufacturing purposes in the town. Many new articles have been introduced, which have proved a great success, the firm having always far more to do in them than they can get through. They, therefore, see no other alternative to meet pressing needs than a further considerable augmentation of premises at a very early date.

Lighting of Railway Carriages in Germany.—The present state of the lighting of carriages is as follows: For lighting material, rapeseed oil, gas, and to a considerable extent even candles are used. Of some 16,168 carriages adapted for illumination 10,968 (or 67.8 per cent.) are lit with rapeseed oil, 2653 (or 16.4 per cent.) with gas, and 2247 (or 15.8 per cent.) with candles. In addition, experiments have been made on some lines with the so-called Möhring oil, which is a mixture of petroleum and rapeseed oil. The gas used is partly made in works belonging to the railway, from fat, paraffin, petroleume, gas oil, or coal tar oil, partly obtained from gas manufacturers. The gasholders, in which gas can be compressed to 5½ or 6 atmospheres, are fixed under the carriages, and connected with the burners by means of tubes with regulators of pressure and valves. The filling of the holders is accomplished either direct from the gas works by means of caoutchouc tubes, or through transportable gas-reservoirs, which can be filled with 5 to 6 cubic meters gas pressed to 10 atmospheres, or from small vessels. A single filling of a gas holder suffices for 30 or 40, or even 60 hours burning. The average consumption, the authorities, per flame and hour, varies in the case of gas between 3.37p. ; in the case of oil, between 7. ; and in the case of candles between 1.8p. and 6p.

The Iron Age

AND

Metallurgical Review.

New York, Thursday, November 11, 1880.

DAVID WILLIAMS - - *Publisher and Proprietor.*
JAMES C. BAYLES - - - *Editor.*
JOHN S. KING - - - - - *Business Manager.*

RATES OF SUBSCRIPTION

INCLUDING POSTAGE.

THE UNITED STATES, BRITISH AMERICA AND SANDWICH ISLANDS.

Weekly Edition.....**$4.50 a year.**
Issued every THURSDAY morning.

Semi-Monthly Edition.....**$2.30 a year.**
Issued the FIRST and THIRD THURSDAY of every month

Monthly Edition.....**$1.15 a year.**
Issued the FIRST THURSDAY of every month.

TO ALL OTHER COUNTRIES.

PER ANNUM. POSTPAID.

Weekly Edition: $5.00—£1—25 francs—20 marks—12 florins—6 roubles (coin)—25 lire—20 pesetos.

Semi-Monthly Edition: $2.50—10/—12½ francs—10 marks—6 florins—3 roubles (coin)—12½ lire—10 pesetos.

Monthly Edition: $1.25—5/—6¼ francs—5 marks—3 florins—1½ roubles (coin)—6¼ lire—5 pesetos.

REMITTANCES

should be made by draft, payable tothe order of David Williams, on any banking house in the United States or Europe; or, when a draft cannot be obtained, in postage stamps of any country.

NEWSDEALERS OR BOOKSELLERS

in any part of the world may obtain *The Iron Age* through the American News Company, New York, U. S. A.; the Wilmer & Rogers News Company, New York, U. S. A., and London, England; or the San Francisco News Co. San Francisco, California, U. S. A.

RATES OF ADVERTISING.

One square (12 lines, one inch), one insertion, $2.50; one month, $7.50; three months, $15.00; six months, $25.00; one year, $40.00; payable in advance.

DAVID WILLIAMS, Publisher,
83 Reade Street, New York.

PITTSBURGH.....77 Fourth Avenue
JOS. D. WEEKS, Manager and Associate Editor.
PHILADELPHIA.....320 South Fourth Street
THOS. HOBSON, Manager.
CINCINNATI.....Builders' Exchange
T. T. MOORE, Manager.
CHATTANOOGA.....Eighth and Market Streets
S. B. LOWE, Manager.

BRITISH AGENCY.

The publishers of *The Ironmonger*, 41a Cannon street, London, England, will receive orders for subscriptions and advertisements on our regular terms.

CONTENTS.

Increased attention is given by capitalists in this country to the gold mines of Canada, and, judging from well authenticated reports reaching us from time to time from different parts of the Dominion, there is every prospect that an industry of some magnitude will be developed, as matters appear to be guided with prudence. The latest district from which we have encouraging statements is that near Brigus, Conception Bay, Newfoundland. Sir Alexander Murray, a prominent Canadian geologist, has visited this new mineral region, and reports that the prospecting done by him has resulted in the finding of several valuable veins of gold quartz. Important as this discovery may be, it is necessary that the true value of the auriferous belt be carefully tested by thorough and intelligent prospecting. It seems that our Canadian friends are looking to this country for the capital required for the development of these mines, and they must therefore be prepared to submit to a close and searching inquiry.

Co-operation in America.

The visit of Mr. Thomas Hughes to this country has given a powerful impulse to the movement in favor of co-operation, notably for the purchase and distribution of merchandise and the necessities of life. There are many circumstances which must be regarded as particularly favorable to a growth of this system among our workingmen. Our political institutions on the one hand and numerous organizations for the settlement of wages disputes on the other, have given our laboring classes a very strong impression of the power of united action. While it would be idle to deny that this power has, in many instances, been wielded with little discretion, it is certain that its influence has been beneficial, on the whole, in training the members to accept broader views of matters affecting their interests. Self-reliance and independence are created by a consciousness of the control of such a power, and they are the only foundation upon which a successful organization for the attainment of a common object can be based. These essential qualities are more fully developed among American workingmen than they are among those of any other nation, and they effectually guard them against the fallacies which have been gaining such headway on the Continent, and which have made possible the gaining of adherents by the fierce apostles of destruction. For bettering their condition, American workingmen must and do actually look to their own efforts. They have until now, and will in the future, reject the advice of those who ignorantly preach that the only means likely to be effective is to destroy the possessors of wealth by fire and sword. They do not now, nor will they ever, insist, like the French, Germans or Russians, that it is necessary to create a government the chief function of which would be to repeat, at frequent intervals, the process of forcibly impoverishing the rich and enriching the poor.

The absence of any such extravagant tendencies likely to alienate the sympathy and arouse the antagonism of the mass of their fellow citizens is very important. If organized prudently and carried out with judgment, a wide application of the co-operative system can only be highly beneficial to those directly interested, and indirectly to the country at large. The two directions in which there is a fair prospect of success is co-operative distribution and co-operative building and insurance. Co-operative production has, in an overwhelming number of instances, proved a failure, and while there may be prospects of its revival at a future remote period, it would be unwise to repeat the experiment now.

The success of co-operative distribution in England, where it has been developed during the last generation, has been complete. It is true that much of that success has been due to the abolishing of an onerous and unsafe long-credit system, and that, therefore, much of the benefit derived by purchasing from co-operative stores must be traced to the reduction of business to a cash basis. As long credits have never been a prominent feature in the dealings between our workingmen and the retail stores, it cannot be expected that the improvement will be as striking here as it has been in England. On the other hand, it is likely that, with some caution, the conductors of co-operative stores will succeed in protecting their customers against an evil which is steadily growing, and from which none suffer more severely than our workingmen. We allude to the unscrupulous methods of food adulteration against which consumers have been well-nigh powerless, and which has assumed its greatest and most dangerous aspect in the lower grades of produce bought chiefly by our working classes. The prospect of being able to obtain not alone cheap, but also more wholesome and durable supplies, ought to be a sufficient incentive to a sustained and well-directed effort. Mr. Hughes, when speaking recently before a meeting in this city, wisely insisted that our workingmen should not go about to rich sympathizers to borrow money for the start. They should begin with their own funds, subscribed by small installments until a sufficient capital is raised, and not until it was obtained. He urged them to choose the best men as a committee of management, and when they had been chosen to have faith in them. With a prudent and conservative management, the fruits of such co-operation will soon compensate for the original outlay. The wonderful record of the Philadelphia building associations is a sufficient proof that our workingmen possess the requisite intelligence and business management, and that it needs only some well-directed effort on their part to organize associations for their own improvement and relief.

The American Society of Mechanical Engineers seems to have made a good start in life, and judging from the success of its first meeting for papers and discussion, it has a long, useful and honorable career before it. Many advantages will result from the care which has been exercised in guarding against the admission to membership of those whose professional standing does not entitle them to rank as mechanical engineers. Those whose tastes or pursuits are such as to place them in sympathy with the work of the society are eligible to associate membership, and graduates of technical schools who have just entered professional life may be admitted as juniors; but every applicant for membership must file a statement in writing of his professional connections and experience, and from this and other sources of information his status is defined by the council, whether as member, associate or junior. This gives a certificate of membership a value almost as great as the degree of M. E. conferred by a technical college, as the fact of membership proves that, in the estimation of a committee of representative engineers, the person admitted to membership has a good professional standing, a varied experience, a clear record, and is competent to design or take charge of work in this department of engineering. Elsewhere in this issue we give as full a report of the meeting of the society in this city last week as the space at our command will admit. The attendance was large and representative, the papers valuable, the discussion animated and practical, and every moment of time well employed. Prof. Thurston is an admirable president, dispatching business in a business-like way and keeping discussion moving, all of which adds immensely to the interest of a meeting. Mr. T. W. Rae, the new secretary, has not yet had opportunity of showing his aptitude for the duties of that office, but he brings to the work abundant capacity and experience, and will no doubt do much to promote the usefulness of the society.

The Verdict Against the Hartford Boiler Insurance Company.

Our comments on the singular verdict in the case of the widow of a man who was killed by the explosion of a boiler in Wilt & Son's establishment, Philadelphia, against the Hartford Steam Boiler Inspection and Insurance Company, though based upon unsatisfactory newspaper accounts, were fully warranted by the facts. Since writing that article we have looked more fully into the case, and are still more surprised at the verdict than when we first heard of it. The facts of the case are briefly as follows: The company had insured the boiler of Messrs. Wilt & Son for nine years, or from the time it was put up until it exploded. It was of the type known as the "double decker"—that is, a 54-inch diameter boiler filled with tubes. These were 73 in number, each 3½ inches in diameter. This boiler was connected to an upper cylinder by four necks. It belonged to a class of boilers very common in Philadelphia, where there are probably 350 or 400 in use at the present time. It was built of scant ⅜-inch iron, "C. H. No. 1" brand, and was made at the People's Works, an establishment well known for its superior work in the line of boilers and engines. It was single riveted in its long horizontal seams, and when new, under the United States tables of maximum pressures, was safe at 115 pounds per square inch. But the policy of insurance allowed only 90 pounds at first, and subsequently only 80 pounds. Near the close of December, 1878, the company's inspector called at the works of Wilt & Son to inspect the boiler. During this inspection he found a blister on one of the fire sheets, and recommended a new half sheet to be put in in place of the one damaged. This was done, and on the 3d of January, 1879, the inspector again visited the place to see that the work had been well done. The tubes had all been removed from the boiler and new ones were to be put in. The shell repairs were all completed, and, with the tubes out, unusual facilities were afforded for a very thorough examination. The inspector was in the boiler for more than an hour with the engineer and the boiler maker. Every seam was carefully examined, and the inspection was as complete and thorough as it could have been. On the 14th of the following May the hydrostatic pressure was applied, which by the city ordinance is required. On the 9th of June the boiler showed leakage around the tubes, and a boiler maker was sent for. He expanded the tubes anew, and waited until steam was up again to see if they leaked, but found them tight. On the 16th of the same month he was called again, and found the boiler leaking badly around the tubes. He said to the engineer, "You have had your water "down." "No," replied the engineer, "I "am forcing the boiler." On the 26th of June an engineer from another establishment visited the works. On the trial this person testified that the boiler was laboring badly, and that he had told the engineer in charge that he would not run it an hour. The engineer replied that he was going "to "put her through until the fourth of July, "and then have her overhauled." On the morning of June 27 it exploded, killing the man whose widow brought suit. The company had not been notified of any trouble with the boiler, and knew nothing until after the explosion of the repairing and tinkering which had been done.

These facts were all brought out on the trial, and yet the jury gave a verdict of damages against the company. Between the man killed and the company there had been no relations of any kind. It looks very much as if it was simply the old story of the unfortunate widow *versus* the rich corporation. The widow clearly had no rights in the matter, but she was a widow needing support, and the sympathies of the jury were with her. Probably they would have been had she sued the People's Iron Works, or the Bank of England, or the Man in the Moon. No doubt the Hartford Company are to a proper degree sympathetic for the unfortunate lady who seeks pecuniary consolation in her bereavement; but they owe it not only to themselves but to society to appeal the case and secure a reversal of this unrighteous verdict in the higher courts. An attempt to rob a company for the benefit of an individual is incipient communism. It establishes a bad precedent, and if allowed to stand may lead to serious mischief, encouraging suits against companies and individuals on no better pretext than that which exists in this case.

The Proposed Reading Settlement.

At last a scheme seems to have been agreed upon by which it is proposed to relieve the Reading Railroad Company of its embarrassments. The "deferred bond" plan is about to be adopted, and the English projectors have, it is said, deposited $2,040,000 "caution money," as a forfeit, with a banking house in New York to bind the contract. This plan involves the issue of $34,200,000 of deferred income bonds, entitled to a dividend up to 6 per cent. out of the profits of the company only after the common shares have had 6 per cent. When each class has had 6 per cent. each is to be entitled equally to half of the surplus, the remaining half of the surplus to go into a reserve fund to provide for interest generally, in case of deficiency in bad years. Each shareholder will be entitled to subscribe at 30 per cent. for $50 of the deferred income bonds for each share held by him, $3 to be paid on subscribing, $4 in thirty days after the allotment, and the remaining $8 in two equal payments at intervals of sixty days. The London syndicate, acting through a London banking house, agreed to deposit with an American bank, to be named by the company, the sum of $2,040,000 as a forfeit to the company in case they fail to comply with an obligation to take, at the issue price, all of the deferred income bonds not taken by the shareholders, and have further agreed that out of the deposit money the company may retain, up to $1,000,000, whatever is necessary to make up the second installment of $4 on such amount as may not be taken by the shareholders. It is stated that a form for the guarantee contract will reach this country in about ten days; that all the Reading receivers and the board of managers have approved of the conditions above mentioned, and that the prospectus is likely to be issued within two weeks, or as soon as the contracts can be signed, the preliminary negotiations having thus far been conducted by cable. This issue, if consummated, will produce $10,200,000. It is then proposed to sell the $5,000,000 of unissued general mortgage bonds of the company, which, after the success of the issue of deferred income bonds, it is assumed will sell for par, making $5,000,000, or a total of $15.200,000, which, after payment of the commission for guarantee, will leave the company more than $1,000,000 over and above its cash requirements. Out of the large amount of collateral returned to the company by the payment of the floating debt, it is proposed by sales to raise enough money within the next two years to meet the deferred coupon scrip which matures in 1882.

In other words, it is proposed that large holders of stock and of bonds of the later issues, to save themselves from the loss which would result from foreclosure proceedings, have agreed to become responsible for an advance of some $11,000,000 to discharge some of the more pressing obligations of the companies, taking in return an income bond which will be entitled to draw interest after the common stock shall have received dividend to the amount of 6 per cent. This is an unpleasant alternative for the holders of Reading securities, but it is better than any other open to them; and some satisfaction may be drawn from the fact that the announcement that negotiations to this end had been consummated, has already advanced the stock more than the sum the stockholders are asked to pay. By prudent and judicious management the Reading companies may yet be able to pull through.

The Trip of the Livadia.

The famous Russian yacht, the Livadia, appears to be fulfilling the expectations of her designers and builders in many respects. Some time since this vessel, which it will be remembered is the latest form of the system first introduced by Admiral Popoff in his circular iron-clads, left England bound for the Black Sea. During the voyage some data were gathered in regard to her speed, &c., which give every reason to hope that she will prove a success, although a serious accident happened to her on the passage. The principal advantage claimed for the design upon which she is built is that the pitching of the vessel will be diminished to a minimum. This has been pretty well ascertained to be a fact in the earlier modifications of the present type. On her trip to Ferrol the Livadia met with very heavy weather, which thoroughly tested her qualities in this regard. In one of those fierce storms for which the Bay of Biscay is justly dreaded by seamen, the vessel pitched but very little. She never exceeded 4 degrees for the single roll, or 7 degrees for the double roll; or 5 degrees for the forward pitch, and 9 degrees for the double pitch. When it is taken into account that the Livadia draws only 7 feet of water, this steadiness is remarkable. The blows of the sea are reported to have been tremendous at times. When she arrived at Ferrol it was found that she was leaking so much that her pumps could not keep the water under. It is distinctly claimed, however, that this leakage was not due to any serious effects of the heavy sea she had passed through, but to the fact that one of her bow plates was stove in and others strained by a collision with floating wreckage. The main trouble with the earlier vessels of the Popoff type was that their speed was not sufficiently great. This has been overcome in the new vessel by the adoption of large and powerful engines and careful preliminary experimental study of her lines. During the trial runs before her delivery to the Russian officers, the Livadia developed an average speed of 15.864 knots with a mean indicated horse power of 12,383. Thus far, therefore, the bold and costly experiment made by the Czar has proved successful, and it is likely, should this accident prove to have been really caused by wreckage, that vessels of her type will be built and find a use in many quarters where the convenience due to steadiness of motion by far outbalances an increased fuel account.

The London *Times*, in an editorial article on "Protection in the United States," says:

The hope that the United States may some day or other be clear-sighted enough to discard protection, and to give and receive the enormous mutual advantages which a free-trade policy would bring with it, has been so often raised and disappointed that our manufacturers and political economists are not easily to be roused to a state of active expectation on the subject. The day, they well know, must come when the United States, after a series of pernicious mistakes, will at length blunder into the truth. The balance between opposed interests will not always be maintained steadily. Free trade will work its way from one point to another, until in due time it is victorious along the whole line. But when this is to happen is a question on which few persons will venture to pronounce confidently. They will be content with watching the progress of events, and with noting each occurrence which seems to bring the final result nearer, or to remove it to an even more immeasurable distance than before.

We think we can answer this question intelligently. The time when the United States can abandon protection will come when Great Britain is so crippled as to be no longer formidable as a competitor, and when we can open our markets without having every artery and vein of commerce choked and congested by an accumulation of British manufactures. Great Britain must find outlets for her manufactured products or sink from her present position to one of second-rate industrial importance. She cannot maintain a manufacturing capacity so far in excess of her opportunities for exportation as it now is. Idle works will fall into decay and capital will not replace them; idle labor will emigrate and carry its skill and experience with it. This process of decay has already begun in Great Britain, but it has not yet been carried far enough to cripple her power to ruin the industries of any nation which, with fewer advantages of accumulated capital and manufacturing facilities, cannot produce so cheaply, and yet is drawn into the snare of free trade. Our experience last year of an oversupply of British goods under a protective tariff gave us a hint, and only a hint, of what might be expected under a revenue tariff or no tariff at all; but it was enough to strengthen the weak knees of those who waned in their allegiance to the principle of protection, and has made free trade or anything approaching it more immeasurably distant than before.

NEW PUBLICATIONS.

THE DUSSELDORF MEETING, 1880. (MEETING DE DUSSELDORF). By Paul Trasenter, Liége.

Among the many essays and papers written on the progress of the Thomas basic process, none gives so complete and comprehensive a review of the subject as that published in the *Revue Universelle des Mines*, by M. Paul Trasenter, professor at the Liége School of Mines, long and favorably known as an able metallurgist. The pamphlet before us is a reprint of that paper. M. Trasenter has gathered a vast amount of scattered information on the basic process, and has brought it into a very convenient shape, which, we imagine, must be very acceptable to those French metallurgists who cannot study the English and German contributions to the subject directly. The literature of the basic process is getting unwieldy, and we believe that the time is not far off when a plain summary will be widely sought by those who have neither the time nor the inclination to go through many elaborate papers read before scientific associations, and not a few of which have now only historical interest. M. Trasenter has done his work as a compiler thoughtfully, and has, in a few instances, added new facts.

The Iron Steamboat Company.—The plans of the Iron Steamboat Company, organized to build and run excursion steamers from New York City, are gradually developing. Mr. Rufus Hatch, who initiated the movement, stated to an *Iron Age* reporter yesterday, that contracts had been made with Messrs. Cramp and Roach, on the Delaware River, for the immediate construction of five steamers, and that they would probably contract for seven more in a day or two. He was not disposed just now to go into particulars, further than to remark that they would each carry 2000 passengers, and were calculated for a speed of 20 miles an hour. He did not know how many steamers Mr. Roach or Mr. Cramp would build out of the five; they were both large stockholders and would divide the work between them to suit their convenience.

Two men were killed on the 4th inst. by an explosion of the Laflin & Rand Company's Powder Mill, at Mountain View, N. J.

American Society of Mechanical Engineers.

FIRST ANNUAL MEETING.

The first annual meeting of the American Society of Mechanical Engineers was held in this city on Thursday and Friday of last week. The theater of the Union League Club, Twenty-sixth street, was secured as a place of meeting, and, while not perfectly adapted to the purpose, answered very well. The attendance was quite large, exceeding 60 at each meeting. A great deal of interest was manifested in the proceedings; the papers were valuable, the discussion intelligent and animated, and the interest was sustained throughout.

The meeting was called to order at 2 p. m., Thursday, November 4. The president, Prof. R. H. Thurston, in the chair. Mr. L. B. Moore, treasurer, was asked to act as secretary of the meeting.

The following is a list of those present whose names were obtained:

F. A. Pratt and C. E. Billings, Hartford, Conn.; J. F. Holloway and C. C Newton, Cleveland, Ohio; E. B. Coxe, Drifton, Pa.; Coleman Sellers, C. T. Porter, R. Grimshaw, Horace See, W. Barnet Le Van, Washington Jones, George S. Strong, Philadelphia; Samuel S. Webber, Oroville, Cal.; C. H. Brown, Fitchburg, Mass.; J. C. Hoadley, Lawrence, Mass.; John Cotter, Norwalk, Conn.; W. T. Nicholson, Providence, R. I.; W. F. Durfee, Bridgeport, Conn.; J. L. Gill, Jr., and Jacob Reese, Pittsburgh, Pa.; Charles A. Hague, Chicago; F. F. Hemenway, Troy, N. Y.; W. H. Hoffman, Passaic, N. J.; E. D. Leavitt, Jr., Cambridgeport, Mass.; L. F. Lyne and A. A. Goubert, Jersey City; D. N. Melvin, Linoleumville, N. Y.; Samuel S. Powel, C. J. H. Woodbury and G. C. Hawkins, Boston; W. H. Odell, Yonkers, N. Y.; Henry Parsons, Newark, N. J.; Prof. S. W. Robinson, Ohio State University, Columbus, O.; R. H. Soule, Baltimore; Allan Sterling, Mill Point, Ont.; Geo. R. Stetson, New Bedford, Mass.; H. B. Stone, Aurora, Ill.; Prof. John E. Sweet, Syracuse, N. Y.; H. Tabor, Corning, N. Y.; E. W. Thomas and E. H. Owen, Jr., Willimantic, Conn.; W. E. Ward, Portchester, N. Y.; Jerome Wheelock, Worcester, Mass.; S. B. Whiting, Pottsville, Penn.; E. H. Robbins, Pittsfield, Mass.; T. R. Almond, Wm. Main, R. G. Ewer, A. Stearns, M. G. Wilder, Brooklyn, N. Y.; J. F. Allen, G. H. Babcock, S. W. Baldwin, J. C. Bayles, W. L. Church, A. W. Colwell, A. F. Du Faur, Thos. Egleston, A. H. Emery, C. E. Emery, S. H. Finch, John Fish, M. N. Forney, D. S. Hines, A. L. Holley, F. R. Hutton, G. B. Mallory, W. Munzer, C. W. Nason, W. A. Perry, J. Rose, Prof. W. P. Trowbridge, W. H. Weightman, W. H Wiley, A. R. Wolff, H. R. Worthington, J. Bailey, H. B. Miller, C. C Worthington and L. B. Moore, New York City; J. J. White, Smithville, N. J.; C. P. Deane, Holyoke, Mass.; Chas. Sperry, Westbrook, Conn.

There were also several Juniors and quite a number of visitors present, including some ladies.

NEW MEMBERS ELECTED.

Frank E. Kirby (Kirby Bros.), Detroit, Mich.; Charles W. Pusey (Pusey, Jones & Co.), Wilmington, Del.; George M. Comly (Edgemoor Iron Works), Wilmington, Del.; Joseph Adams, Superintendent Engineer Standard Oil Company, Cleveland, Ohio; William Atwood, Superintendent Queens County Oil Works, Brooklyn, N. Y.; William H. Harrison, Newcastle, Pa.; Horace Lord, Superintendent Colt's Patent Fire Arms Mfg. Co., Hartford, Conn.; William Mason, Colt's Armory, Hartford, Conn.; Charles P. Howard, S. B., James L. Howard & Co., Hartford, Conn.; Thomas Whiteside Rae, C. E. (care H. R. Worthington), 239 Broadway, New York City; William F. Smith, Division Master Mechanic, Central Pacific Railroad, Carlin, Nevada.

NEW JUNIORS ELECTED.

Edward H. Owens, S. B., Assistant Engineer Willimantic Linen Co.; Edward N. Trump, Assistant Superintendent Delaware Beet Sugar Co., Wilmington, Del.

The regular order having been reached, Mr. J. C. Bayles read the minutes of the meeting held April 7th in the Stevens Institute of Technology, Hoboken.

Mr. L. B. Moore, as treasurer and acting secretary, read a brief report, giving in outline the history of the society. He stated that there were now on the roll 2 life members, 161 active members, 17 associates and 9 juniors. There were a number of nominations which had not been acted on by the council. The financial condition of the society was satisfactory. The receipts had been $2910; the expenditures, $346.7; the balance in bank, $2563.93.

On motion of Mr. Holley, the Chair appointed the following standing committees:

On rooms and conversaziones:

J. C. Hoadley,
Eckley B. Coxe,
J. C. Bayles,
A. Faber Du Faur,
Frederick R. Hutton.

On arrangements for regular meetings:

Washington Jones,
Coleman Sellers,
Wm. Lee Church,
M. N. Forney,
Chas. E. Emery.

The Chair announced that by unanimous vote of the council Prof. John E. Sweet, of Syracuse, had been invited to read the first paper before the society. This compliment was tendered in view of the valuable services which Prof. Sweet had rendered in organizing the society and recruiting the original membership. Prof. Sweet then took the platform and read a valuable and suggestive paper on friction as a factor in motive power expenses. In the course of this paper he described a new form of engine, possessing many features of novelty and advantage, which he had designed and built. We regret that, owing to the necessity for cuts which we have not had time to prepare, we are unable at this time to give a satisfactory abstract of Prof. Sweet's paper.

Mr. Coleman Sellers, of Philadelphia, followed with a paper on the metric system. It was in substance as follows:

THE METRIC SYSTEM—IS IT WISE TO INTRODUCE IT INTO OUR MACHINE SHOPS?

To the great bulk of mankind engaged in trade, in buying and selling, in bartering and exchanging, it matters little what system they adopt; it matters little whether they are obliged to use a yard-stick or a meter-rod, pounds or kilograms, quarts or liters. The cost to them of a change from one to the other is the cost of the few devices needed in weighing and measuring; the *rationale* of the system may never enter their thoughts.

With the machinist the case is different. He must not only possess costly means of measuring and weighing, with a degree of exactness unknown to others, but the results of these weights and measurements are fixed and unalterable. Enormous expenditures on tools, on drawings, on patterns, on everything he uses in making or building his machines are what is involved in the primary system used in determining weight and size. The product of this expenditure means everything that makes modern civilization possible. I propose, in this paper, to consider the subject only as it relates to our own profession; not in regard to its effect on the grocer, the dry goods man, or on the druggist. I propose to show why, after nearly twenty years' constant use of the metric system of measurement, I record my opposition to any enforcing legislation in this direction, because the metric system is not well adapted to the practice of the machine shop.

For nearly 20 years one large department of Wm. Sellers & Co.'s establishment has been worked on the metric system, as thoroughly as the system can be worked in any machine shop; as thoroughly as it is worked in France or Germany. The drawings made for this department are to the metric scale, figured in millimeters. The small tools and gauges are to metric measurement only, and the product of the shop is scaled to metric sizes and called by names based on those sizes.

The metric system was legalized here in May, 1866. Some of its enthusiastic advocates now urge its being made exclusive and obligatory. Societies are organized to teach its principles to the people, and much money has been expended in publishing, but up to this time few conveniences have been placed in the hands of mechanics to enable them to use it in their calculations. Some years ago (the conditions remain the same to-day) letters addressed to leading publishing houses, asking for metric books in the English language equivalent to those to which we constantly refer, which books are as necessary to us as are our other tools, failed to bring a single favorable answer. What was asked for was some book in which formulæ shall be given in the most convenient form expressible in relation to the metric nomenclature. Many books can be found urging its merits as a system, and the writers of these, in showing (!) that the metric system can be learned entire in say 15 minutes, may think they have done what is needed, but no book yet published in the English language, so far as I have been able to learn, even approximates to what is required. There are many very good books of tables for the ready conversion of the measurements of one system into the other, but unless an engineer is as familiar with the metric system as with his own they aid him but little. On the other hand, our English work books are many and valuable. The great bulk of literature of primary importance to mechanical engineers is in English, and expressed in feet and in inches.

The absence of these help books need not, however, prevent any one familiar with the metric system from using it in his practice. If he can think in the new system he can work in it too. He can formulate what is directly needful to him if he will take the time and trouble so to do. In designing any engineering work, proportioned structures can be produced by either scale; the working drawings can be then made to whatever system obtains in the shop of erection. This change from one or the other system in the drawing room is a matter of no difficulty whatever. The change from one system to the other in the workshop, however, involves more than the usual advocates conceive of.

The unit of measurement used in making a machine does not in any way complicate the repairs of that machine. Machines built in England do not always agree with any of our even sizes, yet this discrepancy is a matter of no moment in the repairs of any of them. If we fail to find sizes corresponding to our sizes in English machines, presumably built on the same scale of linear measurement as our own, neither do we find even millimeter sizes, always, in machines from France or Germany.

Wm. Sellers & Co. make injectors for feeding boilers. They make them to the metric scale. Their instruments are made from drawings figured in millimeters in all parts, except where screws and screw threads are needed. Screws to be cut on existing lathes cannot be conveniently figured metrically, unless we adopt the custom of some German shops, to figure in one dimension and make gauges to some other one. A screw bolt in Germany called 25 mm. diameter must be made 25.4 mm. size to conform to the screw system in use there; it will have 8 threads per inch, and consequently 8 threads per diameter (I will explain this later). Screws cannot be metrically divided until metrically divided lead screws have been originated and put in the place of the inch divided lead screws common to all lathes in all parts of the world.

The people into whose hands these injectors pass know nothing of the scale of proportions to which they have been made. If some piece needs repairs and its shape has been lost by wear, it is needless to say that a knowledge of the scale would give no clew to that shape, but from some existing original any part can be copied; to copy requires no knowledge of the scale used. Repairs, too, as a rule, require deviation from original size to compensate for wear. While the value of the unit of measurement may be of little moment in repairs, it is, however, all important in the first production of machines. In shop practice and in mercantile practice, to avoid an endless variety and confusion of sizes, certain dimensions in progressive order are adopted, being the sizes found most useful and most saleable in practice. These progressive sizes we may call, in order to make the matter more easily understood by "advanced thinkers," shop sizes and merchant sizes. It is by the use of well-considered ranges of shop and merchant sizes that the maximum of convenience is obtained at the minimum of cost. Hence, one metrological system may be found to possess advantages over another when put to the test of practice. The one that is best in affording the most convenient and the most easily used and memorized series of sizes should not be called unphilosophical. The resting-place for memory in the American series of shop sizes is the inch. The inch is subdivided by a process of repeated halving down to 1-16 in the usual grade of shop and merchant sizes, as in bar iron. This gives 16 sizes to the inch for small sizes; 8, 4, 2 or 1 to the larger sizes. If a machinist should order from us a set of caliper gauges from ⅛ up to 2, advancing by 1-16, and from 2 up to 4, advancing by ⅛, we are at once informed of the shop system contemplated in his workshop.

Metric-using people have ranges of shop and merchant sizes too; when I come to compare their possible series and their actual series with our own, some faint glimmer may come to those who now know nothing about the matter of the fact that our unphilosophic system is not so very bad after all. In regard to what is involved in each shop size, in a money point of view, I will give but one single example. The inquiry to our own tool-room keepers for a list of the separate devices used in producing one size, viz., 1¼ inch, brings to me the names of 129 articles or sets of articles, such as drills, reamers, gauges, boring bars and cutters, taps of all kinds for all sorts of uses, hardened mandrels, &c. These many pieces, costing many hundred dollars, represent one size only. They tally with and belong to the dimension marked 1¼ in many thousand places on drawings, which have been accumulating for years, to patterns loading down our pattern lofts, to gear wheels interchangeable over a continent, and to the output of our factory for years. So important in an economical point of view has come to be these shop-size series, that machines built in one shop, if to be reproduced (not repaired) in another, must be redrawn to conformity to the shop system in use before the work can be begun to advantage. Year by year this harmony in shop sizes in America spreads over a large area. Entire harmony in essential points exists in many of the leading shops. There are, however, examples still to be found in which machines built in one shop have no dimension in common with the shop sizes we use, as compared to our inch series or our millimeter series, for we use both. The expert recognizes such machines as having been built to gauges varied by the judgment of the master workman, or by the more costly method of fitting one piece to another already completed, a process not admissible in any well-regulated machine shop.

The metrology of the American shops is based on the inch and on it only. This dimension is cut up into minor parts by halving to any degree of subdivision, practically in shop sizes to 1-16th; it is also divided into 10 parts, and into 12 parts when such divisions serve any good end. All such divisions have their uses and lead to no confusion. The inch squared is the base of our strains and pressures. The inch cubed gives us capacities. Later, I will speak of 12 and 36 inches squared and cubed. This one unit, the inch and pound weight of 7000 grains Troy, is all that a machinist needs to carry on his business. His inch is the same inch as is used in England and in the Russian machine shops. His pound is the pound in common use in England.

In America we have dropped some needless weights and measures, just as we have seen fit to drop the letter *u* from some of our words. We do not use in the machine shop the ton of 2240 pounds, nor its quarter or its hundredweight; we do use a weight called "ton of 2000 pounds." This is the factor weight in strains, and by it we sell machinery. Other trades may retain some of these useless things; I am speaking only of machine-shop practice.

The unit of measurement in France and in Germany is the millimeter. It is not and cannot be the meter for the following reason: The great majority of all sizes used in the construction of any machine, whether it be big or little, are less than one meter. By the use of the millimeter only decimals are avoided; 8 millimeters must be written 8 in the millimeter scale, while it must be written .008 in the metric scale. This is reason enough, for by the use of millimeters only, confusion of signs is avoided, and the danger incident to decimals is also avoided; hence all drawings are figured in millimeters only up to dimensions measuring many thousand millimeters. This little dimension is then squared and cubed, or 10 or 100 millimeters are squared and cubed for the uses corresponding to our squared and cubed inch and foot. As may be expected, happy coincidences of conveniences are found in either system. Thus an ardent metric advocate instances that one kilo. to the square centimeter is just one atmosphere. We say 15 pounds to the inch is an atmosphere. Neither one is right, but the 15 pounds to the inch is 1 per cent. nearer right than the other is. For a machinist who seldom uses atmospheres, a happy coincidence on the other side will be of more service. It so happens that wrought-iron bars with parallel sides measure in square inches of this section just one-tenth of their weight in pounds per yard. Now, inasmuch as "shapes" in iron are rated by the pounds per yard for convenience in large structures, so it comes to pass that, when we know the weight per yard of any wrought iron "shape," we know at once its sectional area. Inasmuch as compression and extension and factors of safety are involved in a knowledge of cross section, it is handy to be able to find it so readily, is it not? A shape iron 80 pounds to the yard has 8 square inches area of section. If it is good for 10,000 per square inch in extension, we may load it with 80,000 pounds.

I have set out to compare the two scales—to compare the two units, rather, after an experience of 20 years with both. The inch is 25.4 times larger than the millimeter. These are the two dimensions we are to compare.

We will begin in the drawing room. Few machines, or even parts of machines, can be drawn full size; hence comes the need of "scales." There is reason in all things, even in scales. The unwritten law of most machine shops is to make every drawing as large as possible, as near full size as the nature of the subject and the dimensions of the paper used will permit. We have in our drawing room about 125 drawers, each of which will take in, without folding, drawings 52 inches (1320 mm.) long by 33 inches (840 mm.) wide. This is about as large a sheet as we can use to advantage, and tracings from these are not unmanageable in the workshop.

Down to the one-tenth scale the dimensions can be read from a good millimeter rule, for the one-twentieth, the one-twenty-fifth and the one fiftieth scales must be constructed. The jump from one-half to one-fifth size is unfortunate. Could we conveniently quarter the whole size we would have an increased area section, a matter of much moment. The 1-5 of 10 inches is 2 inches, and the square of 2 is 4. The ¼ of 10 inches is 2½, and its square is 6¼, a gain in size of over 50 per cent; a gain in comfort, in convenience and in eyesight. Here we catch the first glimpse of the advantage of our own system; for with it draftsmen can, from an ordinary well-divided inch rule, obtain the following scales: Full ½, ⅓, ¼, 1-6, ⅛, 1-12, 1-16, 1-24, 1-32, 1-48, 1-64—12 gradations, as compared to 7, and to these 12 can be added with perfect ease 5 of the others, making 17 in all, if the preference be for the decimally divided inch, a scale carried in the tool box of every machinist, and obtainable from the 2-foot rule in so common use.

The scale series in most common use is that of ½, ¼ and ⅛; this halves down from whole size and can be raised, in rapid drawing, by taking off diameter sizes from one drawing and using them as radius dimensions in the other, a process impossible between ½ and 1-5 sizes.

The true value of this extended series of scales, with its peculiar advantages, is manifest to any one familiar with both, and admits of no dispute. Is it a wonder that draftsmen brought up under a metric rule take so kindly as they do our unphilosophical system?

Drawing is but a small part of the engineer's work. More or less calculating has to be done; many hours must be spent in figuring strains, estimating weights, determining speeds and what not. This brings us to the test of convenience in calculation, to the stronghold of the metric advocates.

I have mentioned the innumerable books which have been prepared, simplifying processes of calculations by tabulating the results of experiments on a basis of the inch unit. Of these books the English experiments form a large bulk of the valuable engineering knowledge of the world. Hodgkinson, for example, experimented with the crushing resistances of various substances, and the results of his experiments are in the possession of all engineers. He took samples in cylindrical form, 1 inch diameter, 2 inches long each, for these experiments. Armengaud quotes these experiments and tabulates the results, saying they were obtained by Hodgkinson, *avec des cylindres de* 0^{m}c254 *de d*^{ire} *sur* 0.508 m. *de haut*^{r} = 1″ × 2″, and from these he deduces, for example, that ash has a crushing resistance of from 610 to 653 kilos. per square centimeter.

Mr. Trautwine, quoting Eaton Hodgkinson's experiments, also tells us that ash, weighing from 45 to 53 pounds per cubic foot, has a crushing value of 8600 pounds per square inch. Now, 1 pound per square inch = .0703077 kilo. per square cm., or 1 kilo. per square cm. = 14.2232 pounds per square inch, $\frac{8600 \text{ pounds}}{14.22}$ = about 605 kilos. to the square cm. Here, from Trautwine's deduction, the metric using engineer will employ 605 as a factor where we use 8600 in the same case. He, because his unit of measurement is less, or, rather, requires more figures to express it, multiplies these many figures by a lesser factor, while we, expressing our dimensions with lesser figures, use with these figures a larger factor. In other words, we can complete our calculation sooner, because we are able to deal with the largest measures compatible with convenience. We can use the cubic inch, the cubic foot or the cubic yard, at our pleasure, just as the mechanic selects his tools in accordance with the extent of his work, and don't fool time away driving at a railroad spike with a tack hammer.

It has been my wish to test this matter thoroughly; my experience covers many examples of engineers and draftsmen educated in metric-using countries, who, when they come to us learn to use our measures as quickly as we can learn to use theirs, but adopt our methods of calculation as involving fewer figures. Thus, for all practical purposes, in strains, what will be strong enough in kilos., if we assume two pounds to the kilo., will be near enough right, and if the "grand truth of mechanics is that properties or dimensions of parts of machinery to accomplish any given purpose will be unaffected by any standard of length or weight applied to the part," it is, therefore, possible to arrive at the theoretical proportion by either system, and it is presumable that the workman will select the easiest one to work with, the more so if the easiest one happens to be the one he has been most used to. I have yet to see the example of a metric-educated draftsman working in millimeter calculations on an inch-measured machine, while with our own experience with both we could follow him in either.

Cubic inches go further than cubic millimeters—*i. e.*, they involve fewer figures in their expression; because a cubic inch is 16,000 times larger than a cubic millimeter, it is 16 times larger than a cubic cm.; and while, again, the liter is, may be, 64 times larger than the cubic inch, yet is the cubic foot 27 times larger than the liter, and between the liter and the cubic meter there is no unit of measurement; 10 liters, like our gallon, has an edge only expressible in decimals.

The harmonious relation of extension, bulk, weight and all that comes out strongest when we deal with distilled water. Away from that precious fluid and we are required to know and use the weights of matter as they relate to water. I must confess I see no difference in favor of hunting up in books the specific gravity of matter, or in looking for the weight of matter in pounds per cubic inch, or foot, or yard.

The value of the drawing-room system is tested or tried when the drawings reach the machine shop. It is there that errors are found out. An incorrectly figured drawing costs nothing on account of the errors so long as that drawing rests quietly in its drawer; but it costs fearfully when the error is discovered in the partially finished machine. All engineers agree on one thing, viz., the fewest possible figures that can be used to express dimensions clearly, the easier it is to work to the drawing, and the less liability to make mistakes. Beautiful as is a decimal system in calculation, and we all use it, save in mental arithmetic, it has been found advisable to avoid the use of decimals as far as possible on the drawings used in our workshops, even in metric-using countries. A misplaced point is an easy error to make, and may cause no end of trouble and expense. I had hoped for gain in the drawing room from the use of metric scales; I expected to find more than in the machine shop; I have been disappointed in both.

In the machine shop we come to test the value of shop sizes and merchant sizes, or rather the series possible in both, with one or the other system. For what is in use abroad we look to Germany rather than to France for information useful to us, inasmuch as in Germany the metric system was taken up at a late day, and was introduced in its entirety without shock. To united Germany anything was better than their frightful confusion of 15 inches in use, all differing from the inch still used with their screw threads, and differing from the inch of England. The metric system is incomparably better than their before entire want of any uniformity. With us the matter is very different, as will be seen more clearly as we advance. We divide our unit, in practice, into just what parts are best suited to express our practical wants, and the system in our machine shops is uniform over a continent.

The first item of manufactured matter entering the machine shop door is bar iron. The merchant sizes of round, square, &c., in America, are by 1-16, by ⅛, by ¼, &c. In Germany, similar bars advance in size by 1 mm. up to 40, by 2 mm. from 40 up to 80, and by 5 mm. above 80. This system is memorizable by 40 and 80—by 1, 2 and 5. It is the best that can be done with a system tied up to an unhalvable scale. It does not agree with the English or American merchant sizes, except in a few sizes. The system of bolts, diameters and threads per inch common or general over the Continent of Europe is that known as the Whitworth system. They still adhere to this system as they do to the English system of gas and steam pipes and their fittings. The Whitworth system pitches its threads to even numbers or half numbers per inch in length. These pitches are easily obtained from the lead screws of all lathes, which are 2, 4 and 6 threads per inch as a rule. Having given up the inch, the Germans formulate their threads per diameter (see tables at the end of this paper). For the names of the bolts they must either retain their English names, and call a 25.4 mm. bolt 1 inch, or they must call it what it is, 25.4 mm., but some call it 25 mm., and make it .4 mm. larger. This inch bolt has 8 threads per inch, and as the diameter, too, is 1 inch, it can be said to have 8 threads per diameter. A 1⅛-inch bolt measures 28.6 mm.; it may be called 29 mm. size; it must be cut out of 29 mm. iron, the nearest merchant size, with a loss of 4-10 of a millimeter. This loss don't seem much, but the dies which have to cut it off tell the story very soon. The Whitworth scale gives the same pitch to 1⅛ and 1¼ screws, viz., 7 per inch. The exclusive metric shops call the one 7⅞ threads per diameter, and the other 8¼, and yet they are practically the same and must be cut with the same combination of change wheels on the lathe. Here is a precious example of what comes from trying to harmonize two systems under one nomenclature. The screw system in general use is so good, it has been so long in use, its disturbance would shock so many interests, that it is unwise to give it up, as unwise as it would be to adopt the American gas pipe system in place of the English, or for us, for sake of uniformity with England and Germany, we should attempt to force the adoption of their system into our houses.

Imagine the hue and cry if some "benevolent despot," for the good of mankind in general and Europeans in particular, should direct us to change our "fittings" to English standards, none of which would fit the pipes we have in our houses. Why, we are even vexed enough if we are sold a "sleeve" which will not fit a pipe put in place 30 years ago.

America has, for the last half century, been striving in its own way toward equalization of its standard sizes. The immense railroad industries demand this. Standard wheels on standard axles—standard fit sizes for both—are all founded on an inch scale of sizes.

The shop sizes in America harmonize with the merchant sizes and with convenience. We cannot change them. It would be unwise, I think, to do so in face of the obtainable metric sizes if we could. One example of good and bad systems and I have done with this part of our subject.

An essential of all machine shops is a drill system; a series advancing by 1-16th up to 1 inch, and by ⅛ inch up to 2 inches, is equivalent to an advance by 1½ mm. in a metric series. Such an advance as 1½ mm. is impracticable, because it must be memorized entire; it affords no holding place for the memory. Twist drills were first made in America; they were so good, so useful, that American drills came to be the rage in Europe. After a time good makers there began their manufacture. I will mention one house, founded in 1834, that of Heilmann, Ducommunn & Steinlen, at Mulhouse (Alsace), one of the best known houses in all Europe. They make twist drills from 10 mm. up to 50 mm., advancing by 1 mm., but

(*Continued on page 22.*)

WASHINGTON NOTES.

(From Our Own Correspondent.)

WASHINGTON, D. C., November 10, 1880.

Letters received by members of the government from different parts of the country, and especially the centers of the manufacturing industries, show that a deep sense of relief has followed the settlement of the Presidential question. Without at all regarding the subject in a partisan light, the effect has been to quicken revenues, and, judging from this source of information, brought renewed activity to business. The prominence, too, of the tariff question has also worked a remarkable change in national sentiment on that important subject, and will open a new field of politics when parties again put forth issues for popular arbitrament. As Representatives drop in from divers sections of the country, the tariff question is the common topic of discussion, and among Democrats a large share of their party misfortunes is attributed to the mistaken idea that the people favored free trade, or its sham "tariff for revenue only."

Judging from these sources, at the next meeting of Congress the Committee of Ways and Means and the calendar will be deluged with propositions bearing more or less upon the tariff. Every political demagogue will have a ream of bills to serve to magnify his importance to disturb business, and enable him to set up a howl for popular consumption. It would be well for the great industries, so keenly sensitive to such agitations, to remember that the policy of the present administration will be adhered to, and whatever errors may be committed through excess of ardor on the part of Representatives to make capital by these means, will be on the side of protection rather than of free trade.

General Benet, Chief of Ordnance, in his annual report, just submitted to the Secretary of War, says of the United States testing machine, about which so much has been said in manufacturing and scientific circles during the past four or five years: "This extraordinary machine is now in successful operation at the Watertown Arsenal, under the command of Col. T. T. S. Laidley, Ordnance Department. The appropriation made last session for its care and operation will enable us to fully test its capabilities and make a substantial beginning toward the testing of materials."

This machine is considered the most perfect testing machine in the world, equally able to test a single bar and the largest column; accurately testing specimens by either tension or compression with any load desired, from 1 to 800,000 pounds, the specimens being of any length from 1 inch to 30 feet. Its determinations are of great value to the departments of the government and to the scientific and industrial interests of the whole country.

The Secretary of War, in a letter to the President, says: "The country is now in possession of the most perfect testing machine in the world. The use of metals in all kinds of constructions, both private and public, demands so accurate a knowledge of their qualities as can only be determined by just such a machine as this, and its determination will be of the greatest value to one of the most extensive industries in which our people are engaged."

By an act of Congress, March 3, 1873, an appropriation of $25,000 was made for the construction of improved machinery for testing American iron and steel. Under this act the Ordnance Department ordered Mr. A. H. Emery, of New York, to make a testing machine, to be designed and built by him and erected at the Watertown Arsenal. In March 3, 1875, Congress appropriated $50,000 more for the cost of the machine and prosecuting tests. Under this act the President appointed a board of officers, consisting of Gen. Gilmore and Col. Laidley, U. S. A.; Commander Beardslee and David Smith, Civil Engineer, U. S. N., and Gen. W. Looy Smith, A. L. Holley and R. H. Holley, Civil Engineers. This board requiring additional apparatus, increased the weight of the machine. Instead of weighing 80,000 pounds it rose to 170,000 pounds. This machine was completed Feb. 8, 1879, and is now at the Watertown Arsenal and under the Ordnance Department, ready to make such tests as are required.

Mr. Emery having expended an amount far in excess of the sums appropriated by Congress, asks $200,000, in which request he is supported by the board of officers and a favorable report by a committee of Congress, and it is not improbable that the amount will be paid.

The Treasury Department has rendered an important decision in the matter of the exemption of duty on certain sheathing metal withdrawn from bond for the repair of certain American vessels. The following is the decision:

"After said metal was used on the vessels in question the vessels were sold to foreign owners, and, in consequence of this fact, demand was made for payment of the duties on the sheathing metal placed on them.

"In your letter of the 5th ultimo, the opinion was expressed that the liability of the importers of this metal for the duties due thereon is clear, and reference was made to articles 617 and 760 of the General Regulations of 1874, to support this view. In the letter of the department first specified, the opinion was expressed that the metal was not within the meaning of the regulations used in repair of vessels of the United States enaged in the foreign trade, and that, therefore, duties accrued thereon.

"Decision 2843, dated June 5, 1876, refers to an opinion of the Attorney-General, to the effect that 'only vessels designed to be documented for and employed in trade between this country and that of some foreign nation are entitled to the rebate of duties upon the articles enumerated in section 2513 of the Revised Statutes,' and the same principle, of course, applies to articles withdrawn under section 2514, relative to articles withdrawn for the repair of American vessels, the former section relating to their construction. The reply of the department in the present case was based on these general principles.

"If, however, there was not, at the time the metal was used on these vessels, and before the bonds of the importers were cancelled, any contract, express or implied, for the sale of these vessels to foreign owners, they possessed at the time the metal was so used all the privileges which any American vessel could enjoy under said section of law, being American registered vessels entitled to engage in the foreign trade between the United States and foreign countries, it may well be doubted whether the principle laid down in the opinion of the Attorney General operates to subsequently deprive vessel owners of their rights under the statute, which were absolute at the time the metal was used. Upon this view, the present case turns upon the good faith of the parties to the transaction, and, if you shall be satisfied by evidence under oath that no contract or agreement was made before the cancellation of the bonds to sell these vessels to foreign owners, you are authorized to withhold proceedings for the collection of the duties on the metal specified."

Trade Report.

Office of The Iron Age,
Wednesday Evening, November 10, 1880.

The past week has been one of activity in financial circles, without excitement. The effect of the election was discounted so long in advance that no room was left for improvement when the result was announced, and for this reason the expectations of those who looked for a great revival in Wall street have been disappointed. The local money market has gained a great deal of firmness within a week. The ruling rate to borrowers on call has been 4 %, and as high as 6 % has been paid. The other extreme was reached at 2 %.

The importations of specie and bullion at this port during the past week were $782,450, consisting of $709,896 in gold and $72,554 in silver, as against a total of $4,256,870 for the corresponding week of last year.

Government bonds have fluctuated more or less, but in the main have been strong. On Saturday the Treasury bought $5090 bonds of 1880 at 102¾. State bonds have been active and strong. Railroad mortgages are active and averaging higher than last week. We give below the closing quotation of governments.

The stock market has been unsettled and prices have fluctuated considerably, but the decline up to Saturday has been compensated by subsequent advances. The principal dealings have been in Wabash, Erie, Lake Shore, Western Union, Northwestern, Milwaukee and St Paul, elevated railroad and the coal stocks. We give below the closing quotations of active stocks.

The National bank averages compare as follows for the past two weeks:

	Oct. 30.	Nov. 6.	Comparison.
Loans	$317,880,200	$324,370,200	Inc. $6,490,000
Specie	66,372,400	66,691,700	Inc. 319,300
Legal t'nd'rs.	13,006,700	11,989,600	Dec. 1,027,000
Tot. reserve.	79,389 100	78,080,800	Dec. 707,800
Deposits	302,582,100	307,796,000	Inc. 5,214,600
Reserve required	75,645,525	76,949,175	Inc. 1,302,650
Surplus	3,040,575	1,732,125	Dec. 2,011,450
Circulation	18,616,500	18,691,800	Inc. 45,300

The foreign trade movements for the week are shown in the following tables:

IMPORTS.

For the week ended November 6:

	1878.	1879.	1880.
Total for week	$6,071,200	$6,279,157	$8,478,351
Prev. reported	237,716,345	268,517,600	405,508,287
Since Jan. 1	$243,787,555	$274,796,757	$413,986,638

Included in the imports of general merchandise for the week were articles valued as follows:

	Quantity.	Value.
Brass goods	52	$3,833
Bronzes	53	12,376
Chains and anchors	12	655
Copper	..	181
Cutlery	104	40,664
Pins	1	138
Gas fixtures	2	527
Guns	216	28,105
Hardware	105	2,457
Iron, hoop, tons	661	28,712
Iron, pig, tons	4,730	102,161
Iron, sheet, tons	195	28,060
Railroad bars	30,688	266,260
Iron cotton ties	1,798	1,858
Iron ore, tons	4,382	26,643
Iron, other, tons	2,475	55,803
Metal goods	155	11,882
Nails	8	2,563
Needles	22	8,770
Old metal	..	4,554
Plated ware	6	128
Percussion caps	26	5,201
Saddlery	8	1,249
Steel	7,192	53,616
Silverware	7	132
Tin, boxes	49,572	224,222
Tin, bbls	25	1,079
Tin, 3639 slabs; 417,137 lbs	..	81,165
Teazles	25	92
Wire	114	4,598

EXPORTS, EXCLUSIVE OF SPECIE.

For the week ended November 9:

	1878.	1879.	1880.
For the week	$5,986,068	$8,523,292	$6,055,705
Prev. reported	288,639,406	286,705,565	346,236,178
Since Jan. 1	$294,625,474	$295,228,857	$352,291,883

EXPORTS OF SPECIE.

For week ended November 6:

Total for the week	$26,500
Previously reported	6,702,284
Total since January 1, 1880	$6,728,784
Same time in 1879	13,264,425
Same time in 1878	11,385,866
Same time in 1877	24,121,483
Same time in 1876	41,815,754
Same time in 1875	67,994,342
Same time in 1874	44,363,107
Same time in 1873	45,090,488
Same time in 1872	63,883,456

Government bonds at the close were strong at the following quotations:

	Bid.	Asked.
U. S. 6's 1880 registered	102⅞	103
U. S. 6's 1880 coupon	102⅞	103
U. S. 6's 1881 registered	104⅜	104½
U. S. 6's 1881 coupon	104⅜	104½
U. S. 5's 1881 registered	101¾	101⅞
U. S. 5's 1881 coupon	101⅝	101⅞
U. S. 4½'s 1891 registered	110⅛	110⅜
U. S. 4½'s 1891 coupon	111⅛	111⅜
U. S. 4's 1907 registered	110	110¼
U. S. 4's 1907 coupon	110⅛	110¼
U. S. Currency 6s 1895	126	—
U. S. Currency 6s 1896	127	—
U. S. Currency 6s 1897	128	—
U. S. Currency 6s 1898	129	—
U. S. Currency 6s 1899	130	—

The closing quotations were as follows:

	Bid.	Asked.
Arizona	8⅞	9
American District Telegraph	76	76½
American Union Telegraph	—	60⅛
Atlantic and Pacific Telegraph	40	41
Alton and Terre Haute	34	35
" " Pref	108	110
Boston Air Line	43½	45½
Burlington and Quincy	156	156½
Burlington and Cedar R. and N	66	67
Chicago and Alton	136¾	137¼
Clev., Col., Cin. and Indianapolis	79	80
Climax	½	1
Caribou	2	2½
Canada Southern	66	67
C. C. and I. C	18⅞	19
Colorado Coal	24½	25
Chicago, St. Louis and New Orleans	38⅜	39½
Chesapeake and Ohio	19¾	20
" " 1st Pref	26¾	27¼
" " 2d Pref	20¾	21
Central Pacific	85⅛	85¼
Delaware, Lack. and Western	98	98⅛
Delaware & Hudson Canal	88⅝	88¾
Denver and Rio Grande	78½	79
Erie and Western	32½	32¾
Excelsior Mining	7	7½
Express—Adams	118½	120
" Wells, Fargo & Co	113	114
" American	63	63⅛
" United States	50	52
Houston and Texas	72	74½
Homestake	31	32
Illinois Central	117½	118
Iron Mountain	47⅝	47¾
Kansas and Texas	37⅝	37⅞
Keokuk and Des Moines	8	12¾
" " Pref	—	40
Lake Shore	114⅛	114¼
Little Pittsburgh	2	2¼
Louisville and Nashville	171	172
Mont. Gas	27	33
Mobile and Ohio	22	22½
Metropolitan Elevated	114½	115
Michigan Central	108	108¼
Morris and Essex	116½	117½
New York Elevated	119	122
New York Central	136⅞	137
Nashville and Chattanooga	60	60¾
New Jersey Central	76½	76⅝
Northwest	112⅝	112¾
" Pref	137¼	137¾
Northern Pacific	28¾	29
" " Pref	53¼	53½
New Central Coal	27	28
Ontario and Western	26	26⅛
Oregon Navigation	—	126
Ontario Silver	32	33
Ohio	34⅝	34¾
" Pref	77¼	77½
Ohio Central	25	26
Pacific Mail	46⅝	46⅞
Pittsburgh, Titusville & Buffalo	32	34
Peo., Dec. and Evans	25¾	26¼
Quicksilver	13	13¼
" Pref	50	52½
Rock Island	120	121
Reading	52¾	53
Standard	21½	22
Stormont	4⅛	4¼
Sutro Tunnel	1	1⅛
St. Paul	103½	103⅝
" Pref	117½	117¾
San Francisco	39	40
" " Pref	51½	52
" " 1st Pref	80¼	80¾
St. Paul and Omaha	43⅜	43½
" " " Pref	83⅝	83¾
Texas Pacific	33½	34¾
Union Pacific	93⅛	93¼
Wabash	41⅜	41½
" Pref	74⅞	75
Erie	42¾	42⅞
" Pref	72½	72¾
Hannibal and St. Joseph	39½	39¾
" " Pref	87⅜	87½
Marietta and Cincinnati Pref	7	8
" " 2d Pref	4⅜	5
Manhattan Elevated	37⅞	38⅛
Western Union Telegraph	98	98⅛

MINING STOCKS.

The following were the closing quotations of the New York Mining Stock Exchange:

	Bid.	Asked.
Amie	43	44
American Flag	32	34
Bell Isle	54	60
Bechtel	....	1.40
Buckeye	18	19
Bulwer	1.15	1.25
Bodie	4.10	....
Calaveras	22	23
California	1.70	1.75
Climax	50	51
Consolidated Virginia	2.35	2.45
Consolidated Imperial	16	17
Chrysolite	6.00	6.12½
Dahlonega	10	12
Durango	23	24
Findley	29	31
Great Eastern	53	54
Gold Placer	70	72
Goodshaw	74	75
Granville	7	8
Green Mountain	4.85	5.00
Hukill	1.70	1.80
Iron Silver	2.70	2.75
Lacrosse	30	32
Leadville	43	....
Lucerne	13	15
L. Chief	92	97
Little Pitts	2.00	2.25
Moose	78	81
Maybelle	20	22
Navajo	80	85
Quick. Pf	20	....
Rappah'k	24	25
R. Sun	1.95	2.05
S. Hite	60	70
Silver Cliff	2.25	2.50
Tuscarora	14	15
Unadilla	14	16

GENERAL HARDWARE.

Business continues active, and prices have undergone no quotable change since our last writing. To-day the manufacturers of Augers and Bits, and Chisels and Drawing Knives, held meetings in this city, at which existing prices and terms were reaffirmed. The manufacturers of Axes also held a meeting to-day, but at the close of business their action, if any, had not transpired.

Foreign Hardware is in fair request, and importation orders for next spring delivery are said to be liberal and numerous. No changes in values are reported. Peter Wright's Anvils from stock are quoted 10½ cents per pound. German Halter and Coil Chain, discount 40 and 10 @ 50 per cent. from list.

The demand for Nails is more active than at our last writing, but the tone of the market in the matter of price continues weak. A large buyer would have no difficulty in placing orders on the basis of $2.75 for 10d. to 60d. We quote $2.75, net, for large lots, and for small parcels, $2.80 @ $2.90.

In our last issue we printed a report of the late meeting of manufacturers of Clothes Wringers at Cincinnati, Ohio. We are informed since that at that meeting all the manufacturers who last year pooled their patents have also pooled their sales, the result of which, it is expected, will be to steady and strengthen the market, all cause for cutting prices being removed.

Peck & Snyder, Nos. 124 and 126 Nassau street, have issued, under date of the 1st instant, the following trade prices for Skates and kindred goods:

MANUFACTURERS' LIST.

P. & S. American Club, No. 1	$5.00	Dis. 25 %
" " " 2	6.00	
" " " 4	8.00	
P. & S. Clipper Club, No. 1	3.50	Dis. 33⅓ %
" " " 2	4.50	
" " " 3	5.00	

WINSLOW'S CAST STEEL CLUB SKATES.

No. A. D	$0.60	Dis. 33⅓ %
No. H	1.50	
No. A. X	1.75	
No. B. B	2.25	
No. C. C	3.25	
No. B. X	2.75	

WINSLOW'S LADIES' SKATES.

No. 220	$1.25	Dis. 25 %
No. 270	1.50	
No. 280	2.50	
No. 286	3.00	
No. 348	2.50	
No. 349	3.50	

SKATE STRAPS.

	Per doz. set.	
Common 1¾ Toe with 20-in Heel	$2.75	Dis. 10 %
Best " "	3.50	
" " Pat. Bkl	4.25	
	Per doz. pair.	
Common 20-in. Heel Straps	$1.00	
Best "	1.25	
" with Pat. Bkl	1.50	
Heel Plates, per pair	0.03	Net.
Best Steel Plates, per 100 pair	2.50	
Skate Keys, per 100	5.00	

ICE CREEPERS.

	Per doz. pair.	
Horse Shoe	$2.00	Dis. 33⅓ %
Heel Cork	1.50	
Climax	3.00	
Chicago	6.00	
Heuling's, Brass	9.00	
" Iron	5.00	

ROLLER SKATES.

P. & S. Popular, 4-wheel, Box-wood	$2.50	Dis. 30 %
P. & S. Circular Running, Box-wood	5.00	

N. B.—Write for trade Key, giving discounts on all goods in the sporting line.

The following circular explains itself:

New York, November 8th, 1880.

Dear Sir: We have informed the trade that our Brooklyn factory, destroyed by fire October 27th, will be re-erected and stocked with new machinery, tools, &c., as speedily as is consistent with good workmanship. In the meantime we have put on an extra force at our Ansonia Factory, and have organized temporary workshops in Brooklyn.

We are pleased to announce that Fancy Metal Goods will be produced at once, and that we shall soon be able to fill orders for any of our various lines.

Our Enameled Imitation Marble Clocks are being finished in numbers sufficient to meet the increased demand for them. We invite particular attention to these handsome goods. Orders can be filled immediately.

We have on hand in the Cliff street warerooms, and our Cortlandt street store, a new stock of fine French Clocks, in marble, gilt, and gilt and alabaster; also a large assortment of Bronze Top Figures and Side Ornaments, of our own make or importation, at prices that will recommend them to purchasers.

We promise prompt attention to all orders with which you may favor us. Respectfully,

Ansonia Clock Co.

The Philadelphia Novelty Company illustrate, in their advertisement on the 24th page, a Patent Self-feeding Staple Setter for Wire Fences, of which they say: "This tool is offered to the trade as one without a rival. It carries more than fifty staples in a slide, which are fed up automatically, a staple being thrown in place for driving at each motion of the thumb lever. The tool is filled with staples in a moment, and there is no possibility of injuring the fingers by the hammer or the barbs when driving. With this tool one man can put up more barbed wire fence in one day than two men can without it, and the work can be done in the coldest weather without special discomfort, as heavy gloves can be worn without interfering with the work. The tool is made of forged steel and malleable iron, and is warranted."

BRITISH IRON MARKET.

[Special Report by Cable to The Iron Age.]

London, Wednesday, November 10, 1880.

Scotch Pig.—During the week prices have fluctuated in both directions, but the market is now steady, and there is a fair business doing. Following are to-day's quotations, which show an advance of 6d. in Coltnesss, 1/ in Gartsherrie and 1/6 in Glengarnock:

Gartsherrie	63/
Coltness	63/6
Glengarnock	57/6
Eglinton	52/6

Manufactured Iron.—The market is quiet, and prices steady. We quote Best Staffordshire Bars, £7. 10/.

Steel Rails.—The demand is steady, and prices firmer. Ordinary sections are quoted £6 @ £6. 10/.

Iron Rails.—The demand continues to improve, and a fair business has been done. Prices are steady. We quote Welsh unchanged, £5 @ £5. 5/.

Old Rails.—Offerings are light, and sales fair. Prices are firmer. Old Ts are quoted £3. 17/6.

Scrap—Is without feature of importance. We repeat quotations, £3. 5/.

IRON.

American Pig.—The tone of the Iron market has gained strength since our last writing, and the inquiry is active. Sales of large parcels have been made, but particulars are, in many cases, withheld. We hear of sales of 2500 tons Thomas No. 2 X, in lots, at $21. We quote Foundry No. 1, $25 @ $26; Foundry No. 2 X, $21, and Gray Forge, $20.

Scotch Pig.—Within a few days several lots of outside brands of Scotch Iron held by bankers, in all about 800 tons, have been sold on private terms. We also hear of sales of 300 tons Gartsherrie and 400 tons Eglinton, on terms that have not transpired. We quote: Eglinton, $21.50 @ $22.00; Coltness, $24.50 @ $25; Glengarnock, $23.50 @ $24, and Gartsherrie, $23.50.

Rails.—The only transaction in Rails that has come to our notice during the week is a sale of 500 tons light Steel, at $65, at mill. We quote ordinary sections, nominally, $59 @ 63 for Steel, according to delivery, and Iron, $46 @ $48, both at tide-water.

Old Rails.—The demand for Old Rails is again active, and sales, in lots, aggregating 5100 tons have been closed during the week at $27 and $28 for Ts and D. H. respectively, which are the closing figures to-day.

Scrap.—About 1500 tons Wrought Scrap changed hands during the week on private terms. We quote No. 1 Wrought, $26 @ $27 from yard.

METALS.

Copper.—Sales have been small during the week; some 200,000 to 300,000 pounds Lake Superior sold at 18⅞¢ @ 19¢, the market closing with a good deal of firmness at this figure, while Baltimore may be quoted 18¼¢ @ 18½¢. By cable we learn that London is £62 with Chili Bars, and £67 with Best Selected. "London, Oct. 30.—This market keeps quiet, but quotations show scarcely any change. There is very little doing in Chili Bars, speculators evidently believing that the present prices are too high to be worthy of their attention, and as the stock remains heavy, and it requires a fairly large amount of capital to invest in this metal, there does not seem much probability of speculation reviving yet awhile; nevertheless, if the statistics for this month are favorable, more animation may, perhaps, be given to the market. There, however, does not appear to be anything to induce buyers to effect purchases, except, perhaps, the comparatively low prices; but even this offers but little temptation when it is found that the regular demand barely warrants the maintenance of even current rates." Manufactures remain as under: Bottoms, 31¢; Braziers, according to size, 28¢ @ 34¢; Circles, 31¢ @ 34¢; Segment Sheets, 31¢; Fire-box Sheets, 28¢; Sheathing, 26¢; and Bolt Copper, 28¢.

Tin.—Our market has ruled firmer and higher prices have been paid. About 500 tons Straits sold during the week at 20¼¢ @ 20¾¢. The jobbing demand is good. London cables £91 @ £92. 10/ for Straits Tin, and Singapore £28 per picul, both markets being strong, with an upward tendency. We quote at the close, large lots: Straits, 20½¢ @ 21¢; Australian, 20¾¢, nominally; and Billiton, 20½¢ @ 20¾¢, nominally. The market closes strong, with an improving tendency. Foreign markets are above our parity. "London, Oct. 30.—This market remains rather unsettled, and at the early part of the week prices manifested a downward tendency. The opening price on Monday for cash parcels of foreign was £87. 10/ @ £87. 15/, receding on Tuesday to £87, and on Wednesday the official quotation was only £86. 10/ @ £85. 17/6. After 'Change, however, business was done at rather better prices, and yesterday, the market having opened at £86. 10/, buying became very spirited and prices advanced to £87. 15/, closing firmer at the best. To-day the market has been animated, and closes at £89 @ £89. 5/, cash. At the moment prices appear likely to advance, and if the statistics are again favorable there will, in all probability, be a still further improvement, and prices may make a considerable advance, especially if the deliveries, as expected, prove satisfactory." In Tin Plates a better feeling begins to prevail, and the demand has also increased. Advices per cable from Liverpool are strong also; they quote: Coke Tin, 15/6 @ 16/; and Charcoal ditto, 19/ @ 20/. The closing quotations here for large lines, ordinary brands, per box, are the ensuing: Charcoal Bright, $6.25; ditto Ternes, $5.37½ @ $5.50; Coke Tin, $5 @ $5.12½; and ditto Ternes, $4.87½ @ $5.25.

Lead.—There have changed hands during this week some 900 to 1000 tons, mostly on private terms, but some of it at 4¾¢ @ 4⅞¢. These purchases have been made by consumers, and there is now little left to be had for November, while December deliveries have also been anticipated in part. We quote Common Domestic at the close, 4¾¢ @ 4⅞¢. For Refined the asking price is 5⅛¢, but we hear that small lots have been changing hands at a shade below this figure. "London, October 30.—Business in this metal continues limited, nevertheless a somewhat better inquiry has sprung up this week, and prices are quoted higher. The imports have been rather heavy, while the exports show little or no improvement, and the demand from some of the Indian markets seems to have almost altogether subsided. Manufactures are quoted as follows: Sheet Lead, 7¢; Lead Pipe, 6½¢; Tin-lined ditto, 15¢, and Block Tin Pipe, 40¢.

Spelter and Zinc.—There is nothing doing, and great dullness prevails. We cannot, therefore, quote any higher than last week, say 4⅞¢ for Common Domestic. Sheet Zinc is worth 7¼¢. By mail from Hamburg quite a decline is announced in that locality. "London, Oct. 30.—With a decidedly slack demand, and without any prospect of an immediate improvement, prices have remained easy, but on the whole fairly steady.

Antimony.—This metal has gained somewhat in steadiness. We quote toward the close 14½¢ @ 15½¢, as to brand.

COAL.

Trade at the moment of writing is generally reported quiet, although there are some operators who have a goodly number of orders, and are busy filling them. What activity there is is mostly confined to the different domestic sizes. In free-burning Coals one firm reports that Chestnut is picking up a little. While most dealers profess to be holding fast to the circular rates, some of them admit that upon the steam Coals they do hear of cases of cutting rates. It is also said that the larger sizes of the Lehigh Coals are not held at as firm figures as they were during the early part of the season. The principal demand is for Stove Coal, and this is brisk. The Western trade still contines good, and materially aids in keeping up the strength of the market here. The up-river demand appears to be lively. River freights, owing to the demand for boats, has gone up nearly 20 per cent. within a few days. It is reported that in the Eastern markets liberal concessions are made on manufacturing Coals, which is taken to indicate that the manufacturers are pretty well supplied. Here it is reported that for steam sizes of Lehigh Coals concessions amounting to 10 or 15 cents, or perhaps more, have been made. The shipments of Coal still continue very large, averaging upward of 600,000 tons per week. Prices are nominally unchanged. The quotations for Lump are: $5 @ $5.40 for Lehigh Lump, $4.40 @ $4.50 for Grate and Egg, and $4.45 for Stove of all kinds. The free burning Coals are $4 for Lump and Grate, with Egg from 10 to 20 cents higher. Freights are not changed since our last issue.

EXPORTS

Of Hardware, Iron, Machinery, Metals, &c., from the Port of New York, for the Week ending Nov. 3, 1880:

	Quan.	Val.
Mf. iron, pkgs	62	$978
Spokes, cs	8	165
Pltdw're, pgs.	11	797
Mach'y, cs	52	5,617
Clocks, bxs	6	950
Ag. imp., pkgs	21	1,949
Steel, case	7	1,000
Hdw., cs	88	2,259
Sew. ma., cs.	559	9,610
Belting, cs	12	2,078

Bremen.

Wheels, cs	3	100
Mach'y, cs	7	1,533
Mf. iron, pkgs	4	80
Hdw., cs	12	300
Belting, cs	1	250

Antwerp.

Pltdw're, pkgs	3	250

Rotterdam.

Hdw., cs	24	58
Mf. iron, pkge	1	18

Hull.

Clocks, bxs	52	619
Mf. iron, pkgs	46	300
Hose, cs	425	17,878

Gibraltar.

Ptlm., gals.	128,100	14,232

Dunkirk.

Ptlm., gals.	186,813	13,077

Les Sables D'Olonne.

Ptlm., gals.	121,186	9,100

Corunna.

Ptlm., gals.	160,000	17,600

British North American Colonies.

Coal, tons	470	2,000
Hdw., cs	14	180

British Honduras.

Clocks, bxs	26	710
Mf. iron, pkgs	7	30
Sew. ma., cs	1	48
Tinware, cs	26	187
Nails, kegs	32	103
Cutlery, cs	2	83

Marseilles.

Mach'y, cs	3	80

Cette.

Ptlm., gals.	90,820	7,557

Alicante.

Ptlm., gals.	189,710	18,500

Canary Islands.

Saws, case	1	31
Tinware, cs	2	28
Clocks, bxs	7	150
Revolver, cs	2	81
Hdw., cs	14	127

Messina.

Sew. ma., cs	1	50

Cuba.

Nails, kegs	319	1,110
Hdw., cs	37	454
Glassw'e, cs	22	465
Gas fixt., cs	2	118
Mach'y, pkgs	1,193	8,522
Ag. imp., pkgs	27	822
I. springs, bdls	5	340
Coal, tons	21	100
Clocks, case	1	98
Cop. tubes	3	414
Mach. oil, gals	130	62
Sew. ma., cs	125	1,124
Pumps, pkgs.	9	603
Retorts	12	605
Mf. iron, pkgs	62	387
Iron, pkgs	32	50
Scales, pkgs	78	387
R.R. mtl., pgs.	128	1,187

Genoa.

Pltd. ware, cs.	1	66
Lub. oil, gals	1,966	285
Machy., pkgs	22	2,200

Central America.

Guns, case	1	138
Springs, bxs	2	119
Powder, lbs.	1,800	261
Hdw., cs	26	249
Iron, bars	100	309

Hayti.

Hdw., cs	64	1,851
Machinery, cs	26	1,546
Mf. iron, pkgs.	29	355
Sew. ma., cs	3	37
Shoe nails, cs.	5	69
Mach. oil, gls.	48	33
Packing, pkgs.	2	46
Pumps, pkgs.	2	54
Nails, kegs	95	343
Cutlery, cs	9	220

Venezuela.

Zinc, cs	2	106
Hdw., cs	7	130
Mf. iron, pkge	1	54
Sew. ma., cs.	3	85

Argentine Republic.

Hdw., pkgs	277	6,633
Clocks, cs	2	150
Cartridges, cs	1	50
Ag. imp., pkgs	22	365
Miscellaneous	.	175
Powder, lbs	12,500	2,500
Mf. iron, pkgs.	9	1,222

British Australia.

Wringers, cs.	14	$300
Machy., pkgs.	3	100
Mf. iron, pkgs	18	744
Nails, bxs	2	45
Tacks, bxs	4	35
Hdw., pkgs	280	5,992
Cge. mtl., pgs	49	1,002
Ag. imp., pkge	1	20
Sew. mach. cs	96	2,481
Ptlm., gals.	9,600	1,518
Clocks, pkgs	55	695
Pltdware, pgs	9	1,000

New Zealand.

Tinware, cs.	8	350
Cge. mt., pkgs	85	718
Mf. iron, pgs.	21	220
Machy., pkgs.	21	296
Nails, cs	21	169
Iron safes	6	558
Saddlery, cs	2	410
Tacks, cs	15	315
Pumps, pkgs.	6	205
Hdw., pkgs	275	6,934
Wringers, cs.	28	585
Ag. imp., pkgs	141	2,018
Belting, cs	1	300
Pltdware., cs	26	1,771
Hdw., pkgs	107	4,650
Mf. iron, pkgs	318	2,496
Belting, cs	6	1,525
Nails, pkgs	4	130
Tinware, cs	15	544
Ag. imp., pkgs	18	1,138
Velocipedes, cs	11	702
Cars	10	3,800
Pumps, pkgs.	7	310
Per'mbul's, cs	1	40
Iron, pkgs	25	603
Sew. ma., cs	52	1,147
Car mtl., pkgs	16	850
Pig mtl., pgs	21	1,310
Clocks, pgs	39	1,049
Pltdware, pgs.	10	886
Machy., pkgs.	16	1,579
Glassw'e, pgs.	9	205
Ptlm., gals.	70,000	10,500

Mexico.

Ag. imp., pkgs	109	1,290
Sew ma., cs.	115	2,818
Staples, kegs.	3	40
Machy., pkgs.	341	17,071
Pumps, pkgs.	12	411
Firearms, cs.	6	2,187
Grindstones	132	133
Fuse, bbls	55	367
Pistols, cs	4	1,602
Cartridges, cs	20	441
Iron, pkgs	46	184
W. mills, pgs.	15	157
Iron g'ds, cs	3	239
P. caps, cs	2	115
Mach. oil, gals	300	157
She't zinc, cks	2	45
Tele. matl., cs	1	50
Carbines, cs	1	225
Hdw., cs	1,318	17,107
Cutlery, cs	102	3,016
Shoe n'ils, bxs	20	313
L'mp g'ds, pgs.	14	362
Wire reels	183	1,746
Clocks, bxs	13	677
Mf. iron, pkgs	230	1,624
Nails, kegs	225	796
Steel, pkgs	4	50
Trucks, pkge.	1	51
Revolvers, cs.	3	757
Mf. copper, cs	1	39
Ptg. matl., pgs	11	434
Pltdw'e, case.	1	55
Needles, box	1	188
Grindst's, box	1	190
Carriage	1	500

Glasgow.

Ag. imp., pkgs	4	90
Hdw., cs	29	30[illegible]

Liverpool.

Pltdw're, cs	3	250
Hdw., cs	88	4,145
Mf. iron, pkgs	10	190
Ag. imp., pkgs	14	810
Elec. pla's, cs.	9	1,200
Machy., pkgs.	79	3,93
Rifles, cs	101	23,183
Clocks, pgs	53	11,800
Tele. mtl., cs.	2	400
Lub. oil, bbls.	50	75[illegible]
Tel. mtls., pgs	6	1,172
Brassgoods, cs	39	3,110
Pistols, cs	5	900

French West Indies.

Pltdware, box	1	74
Hdw., pkge	1	5
Carriages	4	1,26[illegible]
Clocks, bxs	2	8

London.

Hdw., case	6	256
Mach'y, cs	2	300
Cars	2	1,943
Clocks, cs	5	413
Rifles, case	1	[illegible]
Ptlm., gals.	315,340	44,613
Brit. ware, cs.	2	200

British West Indies.

Carriages	3	450
Hdw., cs	1	60
Sew. ma., cs	1	9
Mf. iron, pgs.	4	50
Nails, kegs	10	61
Petlm., gals.	4,500	716
Metal, cs	16	889

IMPORTS

Of Hardware, Iron, Steel and Metals into the Port of New York, for the Week ending November 8, 1880:

Hardware.

Burkinshaw W. C & Co.
Mdse., pkgs., 4
Boker H. & Co.
Cases, 23
Pkgs., 81
Cask, 1
Calhoun, Robbins & Co.
Cases, 5
Curley J. & Bros.
Mdse, pkgs., 2
Drexel, Morgan & Co.
Anvils, 81
Downing, Sheldon & Co.
Cutlery, cs., 2
Folsom H. & D.
Cases, 6
Field A. & Co.
Cases, 21
Casks, 12
Anvils, 168
Mdse, pkgs., 5
Graef Cutlery Co.
Mdse., pkgs., 4
Godfrey J. C.
Guns, cs., 6
Hildick A. H.
Hammers, csk., 1
Chains, csk, 1
Anvil, 1
Hartley & Graham,
Guns, cs., 8
Arms, cs., 7
Mdse., pkgs., 3
Gun caps, cs., 6
Lamarche H.
Nails, bbls., 37
Loewi E.
Cases, 2
Merchants' Dis. Co.
Guns cs., 7
Moore J. P. & Sons,
Gun caps, cs., 3
McCoy & Saunders,
Mdse, pkgs., 11
Moss F. W.
Files, csks., 5
Peters Bro.
Steelware, cs., 8
Strasburger O. & Co.
Shovels, pkgs., 12
Schoverling, Daly & Gales,
Cases, 7
Arms, cs., 16
Gun barrels, cs., 4
Cart. cases, cs., 3
Thompson J.
Case, 1
Von Cliff & Co.
Whetstones, cs., 12
Walscheid C. A.
Skates, cs., 1
Ward Asline
Cases, 3
Wiebusch & Hilger Hdw. Co.
Cutlery, Hdw. and anvils, pkgs., 256
Order.
Bundles, 69

Iron.

Byrne Jos. & Co.
Steel, bdls., 183
Bank of N. Y.
Hoops, bdls., 2695
Bank of Nevada,
Scrap rails, 289
Brown Bros. & Co.
Wire coils, 725
Bars, 592
Baring Bros. & Co.
Pig, tons, 200
Coddington T. B.
Sheet, boxes, 78
Sheet, bdls., 150
Drexel, Morgan & Co.
Ore, tons, 1021½
Pig, tons, 406

Lundberg Gus.
Coils, 106
Mason J. W. & Co.
Wire rope, coils, 219
Neuman R. & Co.
Machinery, cs., 8
Osborn J. & Son,
Scrap sprgs., pairs, 8
Prosser Thos. & Son,
Bundles, 12
Pierson & Co.
Sheet, bdls., 132
Stroud, W. L.
Hoops, bdls., 2130
Taylor D. & Son,
Scrap, kilos., 758,237
Tillotson L. G. & Co.
Wire, lots, 211
Wegan & Co.
Scrap, rails, lbs., 33,955
Order,
Plates, 32
Cotton ties, bds. 4680
Cases, 700
Machinery, cs., 11
Ore, tons, 2622
Ferromanganese, pkgs., 34
Ferromanganese, cases, 192
Spiegel, tons, 985
Spiegel, kilos., 350,160
Specular, lots, 1
Scrap, tons, 238
Rails, 3156
Pig, tons, 517
Sheet, bdls., 168
Sheet, pkgs., 2000
Bars, 5040
Bundles, 665
Scrap, rails, 19,209
Rods, bdls., 1212
Railroad bars, 4466
Scrap, lot, 1
Hoops, bdls., 6447
Wire rods, lots, 2012
Wire, bdls., 1512

Metals.

Bank of Montreal,
Tin plates, bxs., 4760
Bank of B. N. America,
Tin, slabs, 1013
Brown J. B. & Co.
Scrap, brass and copper, pcs., 7
Byrne Jos. & Co.
Tin plates, bxs., 3838
Baring Bros. & Co.
Tin, slabs, 513
Coddington T. B.
Tin plates, bxs., 70
Dickerson, Van Duzen & Co.
Tin plates, bxs, 2218
Taggers, bxs., 100
Elwell Jas. W. & Co.
Scrap, pkgs., 16
Henderson Bros.
Antimony, csks., 33
Lamarche H.
Zinc, csks., 24
Naylor & Co.
Tin plates, bxs., 2834
Phelps, Dodge & Co.
Tin plates, bxs., 6011
Struller, Lord & Co.
Copper, cs., 24
Order,
Tin plates, cs., 8
Tin plates, bxs., 15,858
Tin, slabs, 761

Steel.

Abbott Jere. & Co.
Cases, 16
Bank of B. N. America,
Rails, 4290
Blake & Co.
Bundles, 130
Lee Jas. & Co.
Blooms, 975
Moss F. W.
Bundles, 75
Bars, 34
Prosser Thos. & Son,
Bundles, 283
Bar, 1
Axles, 20
Tire forgings, 45
Sanderson Geo.
Casks, 6
Bundles, 62
Temple & Lockwood,
Tires, 34
Bundles, 117
Bars, 37
Cases, 6
Wells, Fargo & Co.
Plates, cs., 3
Walscheid C. A.
Bundles, 77
Woodford W. O.
Bundles, 253
Bars, 55
Cases, 37
Order,
Scrap, rlwy. springs, tons, 105
Casks, 16
Cases, 13
Springs, bdls., 177
Steel wire, bdls., 615
Packages, 19
Bundles, 53

OLD METALS, PAPER STOCK, &c.

We have no change to report in prices of Old Metals, the market continuing dull and inactive.

Copper, heavy	℔	lb.	$0.15 @	$0.15¼
Copper Bottoms		"	.12½ @	.13
Yellow Metal		"	.08 @	.08¼
Brass, heavy	℔	lb.	.10 @	.10½
Brass, light		"	.08 @	.08½
Composition, heavy		"	.12 @	.13
Lead, heavy		"	.03½ @	.03¾
Tea Lead		"	.03¾ @	.03½
Zinc		"	.03 @	.03¼
Pewter, No. 1		"	.11 @	.12
Pewter, No. 2		"	.08 @	.09
Wrought Iron	℔	ton	17.00 @	18.00
Light do		"	10.50 @	12.00
Stove Plate		"	10.00 @	11.00
Machinery do		"	14.00 @	15.00
Grate Bars		"	.... @	5.00

The prices current for Rags, &c., are as follows:

Canvas, Linen	℔	lb.	3½c. @ .....
White Cotton, New		"	3½c. @ .....
" " No. 2		"	2½c. @ .....
White, No. 1		"	3½c. @ 4c.
" No. 2		"	2½c. @ .....
Seconds		"	1½c. @ 1¾c.
Soft Woolens		"	10 c. @ .....
Mixed Rags		"	2 c. @ 3 c.
Gunny Bagging		"	1¾c. @ .....
Jute Butts		"	2¼c. @ .....
Kentucky Bagging		"	3 c. @ .....
Book Stock		"	2½c. @ .....
Newspapers		"	2 c. @ .....
Waste Paper and Scraps		"	1 c. @ .....
Kentucky Bale Rope		"	4 c. @ ....

PHILADELPHIA.

Office of *The Iron Age*, 220 South Fourth St., PHILADELPHIA, Nov. 9, 1880.

Pig Iron.—Since date of our last report there has been a steady demand for Pig Metal, and prices have been well maintained. Several very large lots were taken some two or three weeks ago, and although prices were low, their removal has had a good effect, as they had been pressing on the market for some time. If the demand should be maintained, as during the past two weeks, some further advance in prices might be looked for, but it seems probable that production is in equal proportion to consumption, and the indications of further advance are, therefore, somewhat remote. The movement of the past two weeks was clearly indicated in our report dated October 19th, as follows: "Stocks are accumulating at furnaces, but there is probably so much less in consumers' yards, so that the difference is simply one of ownership. Consumption keeps up surprisingly, and with the gradual absorption of foreign material the present output at furnaces is not excessive, and the depression of the last two months not the result of over-production, but more on account of consumers cleaning up stocks before entering into new engagements. It is probable, therefore, that buying will set in along the whole line in the course of two or three weeks, and extreme dullness give place to considerable activity. This opinion is based on the fact that purchases of raw Iron for several weeks past have been entirely out of proportion to what has been consumed, and as there are no grounds for apprehending a falling off in consumption, buying in proportion must necessarily follow." It will be seen, therefore, that the recent heavy transactions are not to be attributed to speculation, but are of an entirely legitimate character. During the balance of the year it need not occasion surprise if the market is very quiet; leading consumers have bought all they are likely to require for some time, and will, therefore, not be likely to buy again at the now slightly advanced prices. On the other hand, the furnaces have got rid of their stocks, and in many instances have their capacity engaged for several weeks to come, so that, while there will probably be less demand, there will also be less iron offered. Prices, therefore, are not likely to show much change, and a steady and satisfactory business to all parties is confidently anticipated. It is difficult to give exact quotations; many new brands are on the market, and in order to introduce them prices have been marked down, so that while we hear of good No. 1 Foundry at $24 and Gray Forge at $19 @ $19.50, these prices are quite exceptional, and not in keeping with the general market. The best and most favorably known brands are firm and may be quoted at $25 @ $26 for No. 1; $22 for No. 2, and $20 @ $21 for Gray Forge. Bessemer Iron is very dull, and $24 a nominal quotation. Charcoal Iron is steady at $35 @ $38; Scotch Iron a fraction higher, and for small lots from store may be quoted $21.50 @ $22 for Eglington, $23 @ $23.50 for Glengarnock and $24 @ $25 for Gartsherrie.

Muck Bar.—Business has been a little quiet during the week, but prices are unchanged, say $38 at mill for fair quality.

Blooms.—There is very little business doing, but prices are steady and unchanged, viz.: Cold-Blast Charcoal Blooms, $67.50 @ $70 per ton of 2,464 lbs.; Run-out Anthracite, $57.50; Sunken Scrap Blooms, $52.50 per ton of 2240 lbs.; and Northern Ore Blooms, $48 @ $50.

Structural Iron.—There has been a very active demand during the past week, and some heavy orders have been entered. All classes of buyers have been in the market, and the mills have about all the business they can manage. Sales of about 2000 tons of shapes have been made during the week to bridge builders, a similar quantity to ship builders, and rather more than the usual amount for architectural purposes. Business promises to be very active during the winter. Bridge building and ship building especially show considerable improvement, and a good deal of iron will be consumed in this direction. Prices are steady and without change, Angles being quoted at 2.6¢; Beams, 3¢; Channels and Tees, 3.2¢.

Plate and Tank Iron.—There has been considerable activity in this department also, chiefly in the connection mentioned above. It is notable, however, that prices have not been maintained, and some orders have been taken at unusually low rates. One lot of ship plates (about 700 tons) was taken at fully $3 per ton below the market, and buyers are all looking for similar concessions. Manufacturers are now so well supplied with work, however, that it is thought prices will stiffen up again. In addition to the sales of ship plate, there has been an active demand for the higher qualities of iron, and sales of 400 tons of Flange Iron are reported at 5¢. The following may be regarded as fair average quotations at this date, viz.: Tank and Common Plate, 2.75¢ @ 2.87½¢; C. No. 1, 3.3¢; C. H. No 1, 3.5¢; Flange Iron, 4¾¢ @ 5¢; Fire Box, 5¾¢ @ 6¢.

Sheet Iron.—Business keeps moderately active, and manufacturers are expecting a good trade up to the close of the year. They are accumulating stocks just now, but when the cold weather sets in it is thought there will be a renewal of the demand. Prices are steady and unchanged, and for small lots may be quoted as follows:

Common Sheet, No. 26 to 28	4¼¢
Common Sheet, No. 22 to 25	4½¢
Common Sheet, No. 16 to 21	4¾¢
Best Refined ¼¢ @ ½¢ advance on the above.	
Best Bloom Sheets, No. 26 to 28	7¼¢
Best Bloom Sheets, No. 22 to 25	7 ¢
Best Bloom Sheets, No. 16 to 21	6¾¢
Common Red Plates, 3-16 to 16	3.4¢
Blue Annealed, 3-16 to 16	3.5¢
Best Bloom Galvanized, discount	30 %
Second quality, discount	40 %

Bar Iron.—There is very little change to note in this department, and the general report from manufacturers is of an unsatisfactory character. The demand is moderately active, but prices show scarcely any improvement, although cost of production will be nearly a tenth higher, based on the advance in material. Some good-sized orders have been placed during the week, and the mills are likely to have all the work they can manage. The largest consumers are known to have more orders on their books than at any previous time. Some of the biggest concerns are full to their utmost capacity for six or eight months to come, and all are pushed for early deliveries. Under these circumstances it might reasonably be supposed that there would be some improvement in the price of Bars, but there is no signs of it at present. One reason for this, probably, is owing to the dullness in the Pittsburgh market, and the fear of competition from that quarter. In this connection we venture to refer to a statement which appeared in a highly respectable, and usually very accurate, Pittsburgh daily. A special correspondent from Philadelphia, under date of November 6, writes in most glowing terms in regard to the Iron trade here. "The Bar trade," he says, "is active at 2.4¢, with transactions to the extent of 3000 tons at that price in one office," &c. Neither manufacturers nor brokers can agree with such a statement; 2.3¢ is about all that can be got for a decent sized order, and 2.4¢ is merely a nominal figure. With prospects of such a heavy demand, however, it is hoped that 2.4¢ will soon be an actual selling rate, but it can scarcely be considered so at present.

Steel Rails.—We have not heard of any new business during the past week, and prices may be considered unchanged. There is plenty of business to be had, but for the present manufacturers prefer to run off what they have on hand, rather than enter into new engagements. It is quite evident that there will be more work than can be done at home, so that there is little anxiety in regard to the future. About $60, at mill, may be considered a fair average quotation, but it is not certain that orders would be taken, unless for distant delivery.

Iron Rails.—There are further inquiries for new Rails, but we have not heard of any actual sales during the past week. Manufacturers are firm, and present indications favor higher prices in the near future. The advance in the English market is equal to $1 to $1.50 per ton, and the higher cost of material is quite likely to cause a similar appreciation on this side. About $46.50, at mill, may be considered an inside figure for standard Rails, and it is not likely that concessions could be obtained. Light Rails command $48 @ $52, according to pattern; market firm.

Railway Supplies—Are in fair demand, and sales at the following quotations; for large lots prices possibly shaded a little: Spikes, $2.75; Fish Plates and Splice Bars steady at 2.4¢ @ 2.5¢; Track Bolts, $3.75 @ $4.50, according to specification.

Old Rails.—The market is feverish and unsettled, but prices have an upward tendency. Holders, in many cases, ask a further advance of $1 per ton, but this has not been met except for small lots. Buyers find it increasingly difficult to place orders, and for the present holders appear to command the market. Several transactions are reported at $26 @ $26.50 for Flange Rails, but $27 @ $27.50 is now asked, and it is almost certain that buyers will have to advance their bids before they can place their orders. Double heads are very scarce and held at $28.50 @ $29; we hear to-day of $29 bid for 200 tons, but the holder declined to break the lot.

Scrap Iron.—The demand is very active and higher prices are asked, and, in some recent transactions, have been realized. Machinery Scrap is worth about $20; Wrought from $27 @ $30, according to quality. Sales to-day of 250 tons at $30 for a choice lot.

PITTSBURGH.

Office of *The Iron Age*, 77 Fourth Avenue, PITTSBURGH, PA., Nov. 9, 1880.

Since the excitement incident to the election has subsided confidence is restored, and as river navigation has been resumed, there is a much better feeling in business circles. In fact, there has already been a perceptible improvement, and the opinion prevails that it will be maintained until the close of the year. For two or three months prior to the election, business here in nearly all branches of manufacturing was very much curtailed, large orders having been held back to await the result, but, as already stated, there has been increased demand, orders having commenced to come forward again, and a much better feeling prevails in consequence. Railroads and steamboats have all the business they can possibly do, and it is found difficult, owing to the pressure upon them, to obtain speedy transportation. The outlook is, in many important particulars, much more encouraging than it was at this time last year. Then it was largely speculative; now it is healthy and legitimate, as the business is being done by manufacturers, jobbers and consumers.

Pig Iron.—It was very generally believed that there would be an increased movement after the election, but it has come sooner than expected. As soon as the result was ascertained some large operations were effected, chiefly in Bessemer, and the indications are that there will be considerable activity in Forge and Foundry grades within the next week or two. While, as yet, there has been no quotable advance, a firmer feeling appears to have been developed. That some consumers are apprehensive of higher prices is evident from the fact that they are anxious to anticipate future wants at current rates. However, it is not generally expected that there will be a considerable, if any, advance. The trade generally is opposed to anything like a "boom," realizing that it would be productive of a good deal more harm than good. While it is true that at ruling prices those furnaces enjoying the greatest advantages have but a small margin for profit, it is well to bear in mind that the raw article is higher relatively than the products. The products of the former, too, is larger and increasing, and there is a large stock of imported Iron in bond, to be disposed of in some way. Forge Irons may be quoted as follows: Cold-short, $20 @ $21, 4 mos.; Neutral, $22 @ $23; Red-short cinder mixture, $23 @ $24; all Ore do., $25 @ $26; Bessemer, $26 @ $27. Sales of some 10,000 to 11,000 tons Bessemer were effected during the latter part of last week, and while the price was private, it is understood to have been somewhere about $26, delivered in Pittsburgh. The Iron was sold by furnaces out in the valleys. Foundry grades are still quoted at $23 @ $26 for Nos. 2 and 1. Eastern Cold-Blast Charcoal, $38 @ $40.

Manufactured Iron.—A much better and more confident feeling prevails, and a steady business is looked for from now on until the close of the year. We are cognizant of some pretty good-sized orders having been placed within the past few days, and while the market is firmer in tone, prices are no better. Merchant Bars may be fairly quoted at 2.15¢ @ 2.25¢ rates, 60 days, 2% off for cash. Sheet Iron, 3.75¢ @ 3.85¢ for No. 24; Skelp, 2.25¢ @ 2.35¢; Plate, 3¢, and Tank 3.25¢. Those mills making the latter are all oversold, and it is firm at quotation.

Nails.—The Nail trade continues dull, as it nearly always is at this season of the year, and it is not to be supposed that there will be any decided change for the better until the spring trade opens up. Prices continue weak and irregular. They may be quoted at $2.60 @ $2.65, 60 days, 2 per cent. off for cash, with an abatement of 10¢ per keg on carload lots. Some of the factories are still running, but they are either piling up or filling old contracts, as there are but very few fresh orders coming forward. The Nail trade has been the most unsatisfactory part of the Iron business for several years past, a fact which must be solely attributed to overproduction. There are entirely too many machines.

Steel.—The situation as regards this most important interest remains about as noted in our report last week. While there is no particular rush of orders, the mills generally appear to be busy, and prices are reported steady. Refined Steel of best quality, 11¢ @ 12¢ per lb, according to size of order; Crucible Machinery ditto, 6½¢ @ 7¢; Bessemer and Open-hearth ditto, 5¢ @ 5½¢; Bessemer and Open-hearth Spring and Plow ditto, 4¢ @ 4½¢.

Wrought Iron Pipe.—There appears to be no abatement in the demand, which has been active since the close of the summer, all the mills in the country being as busy as they can be, and are unable to catch up with their orders. Prices are unchanged at 60 @ 65 % discount on regular list; Boiler Tubes at 40 % off; Oil Well Tubing, 21¢ per foot, net; ditto Casing, 70¢, net.

Muck Bar.—In the absence of sales Muck Bar may be quoted nominally at $38 @ $40. Very little has been sold in this market.

Railway Supplies.—An increased business is expected, particularly for immediate deliveries. Railway Spikes are quoted at 2½¢ @ 2¾¢, 30 days; Splice Bars, 2.10¢ @ 2.25¢; Track Bolts, 3½¢ @ 4¢, the latter with hexagon and the former with square nuts. Steel Rails are still quoted at $60 @ $65, according to time and point of delivery. It looks as if there were to be no let up in the demand for some time to come; hence the outlook in this important American interest is very encouraging.

Scrap.—While the feeling is better, as an increased business is expected within the next week or two, the market at present is quiet and prices remain about as last quoted: No. 1 Wrought Scrap, $25 @ $27 ℔ net ton; the latter for selected railroad; Old Car Springs and Car Axles, $34 @ $36, net.; Cast Scrap, $15 @ $16 ℔ gross ton; Old Car Wheels, $32 @ $34 ℔ gross ton; Old Iron Rails, $28 @ $30 ℔ gross ton.

Window Glass.—There is a very fair business for the season, and some of the factories are likely to have about all they can do until the close of the year in working up former contracts. No change in card or discounts is reported.

Coke.—Business in Coke is more active, the resumption of river navigation having had a most beneficial effect; rail transportation is also more easily obtained, and large shipments are being made in all directions. About 1,500,000 bushels were shipped to points down the river on the recent freshet. The better feeling as regards pig Iron has also had a good effect, and prices are firmer, with a tendency to go higher, although an advance is not expected. We now quote at $1.50 ℔ ton, delivered free on cars at ovens for round lots, and $1.65 @ $1.75 for small foundry orders.

Coal.—The shipments by river on the freshet last week reached in round numbers about 8,000,000 bushels, the great proportion of which was consigned to Cincinnati and Louisville. The most of this Coal has already reached its destination, and in a day or two the fleet will be getting back home with tows of empty barges, which, after being distributed, will cause a general resumption of mining in the Monongahela Valley. The price for mining remains unchanged, 3½¢. The railroad operators still have all they can do, and the indications are that there will be an active demand all winter. Pittsburgh Coal is finding its way into new markets every year, supplanting other Coals in consequence of its superior quality.

Petroleum.—The crude oil remains much the same as noted in our last report. While there is a continued fair degree of activity, there is no improvement to note in price. The production continues large; the visible supply is still steadily increasing, with no apparent abatement in development; hence prices continue unremunerative. Only a small percentage of the wells are more than paying actual expenses. During the week under review united certificates have sold at 95 to 90, and immediate shipment at 20¢ additional. In regard to Refined there is not a single new feature to report.

CHATTANOOGA.

Office of *The Iron Age*, Market and 8th Sts., CHATTANOOGA, Nov. 8, 1880.

All kinds of material here show a stiffer market, Nails excepted, since the election. The isolated position of the district and the increase of local consumption have combined to keep prices rather steadier than they have shown in the Eastern and Northern markets. The fluctuations during the fall months have been trifling. In crude material there has been a general scarcity of most kinds for several weeks, and prices have ruled stronger than those for finished articles. The weather has been cool and dry, the week ending cold, with rough storms of wind and rain. The streams continue low, and this is a serious drawback on trade in heavy articles.

Pig Iron.—Pig is scarce, especially Foundry grades. There is practically no No. 1 Foundry in the district. The furnaces are all sold ahead on that grade, and will not be able to supply general dealers with any for several weeks. The latter are several weeks behind orders for this grade. Other grades are in only fair supply. We quote same as last report, though No. 1 Foundry would command a small advance on outside figures. No. 1 Foundry, $25 @ $27; No. 2 Foundry, $23 @ $25; Gray Forge, $20 @ $22; White and Mottled, $18 @ $20; Car Wheel Metal, $40 @ $45.

Miscellaneous Articles.—Old Rails are fairly plenty and rates rather better maintained than for some time past. We continue to quote at $22 @ $26; Wrought Scrap, $20 @ $24; Cast, $15 @ $17; Old Wheels, $28 @ $30.

Ores.—We quote: 50 % Brown Hematite, per ton, $2 @ $2.75; Red Fossil, $2 @ $2.25.

Nails—Have weakened since our last report. We quote them at $3.10 rates, a reduction of 15¢; usual discount on 200-keg lots and for cash.

Manufactured Iron.—Pittsburgh is quietly cutting the local card rate and selling at about $2.10 rates, for large lots at mills, for best Refined Bar. Birmingham, Ala., continues to sell to Nashville and to leading Southern points from 10¢ to 30¢ below their quotations to general dealers in this market. Our dealers, as a rule, realize quotations. We quote: Bar, weak at $2.40 rates; Railroad Spikes, $3; Track Bolts, $4; Trestle Bolts, $4.50; Fish Plate, $2.50. Bar is stiff at quotation.

Coal.—We quote run of mine at $1.65 @ $1.75 at mills; Lump, 12¢ @ 15¢, at yard.

Coke.—Furnace Coke, $3 per ton at furnace; Foundry, 10¢ @ 12¢ per bushel.

Steel and Iron Rails.—The stiffening in the Eastern markets has helped here slightly. The mills have plenty of work in hand. We quote Steel at $62.50 for American makes, $60 for foreign. Iron, $48 @ $50; Small T is firm at $55.

Lead.—We quote: Pig Lead, 4½¢ @ 5¢.

Steel.—Plow Slabs, 3 in. and under, $4.70; Black Diamond, ordinary sizes, 13¢.

CLEVELAND.

November 9.—The demand for metal has been only fair for the past week, though prices are firmer. The sales of Bessemer metal during the past 10 days have been on a large scale, but at prices much lower than the trade generally thought would be accepted; $23.75 @ $24, cash, at furnaces in the valleys seems to have been the basis of the Bessemer metal contracts. The Bessemer Steel works have no reason to complain of the margin of profit, while to the writer's positive knowledge there is a loss of $1 @ $2 ℔ ton to the makers of the Pig Iron at prices named. It is but fair to state that many of the producers of both Bessemer and Foundry Irons are not accepting such ruinous prices, and are firm in the belief of better prices within a short time.

BOSTON.

November 6.—The market for raw Irons is characterized by firm prices and a steady feeling on the part of holders, but the inquiry is still moderate. We quote *American Pig Iron* at $25 @ $26 for No. 1 X; $20.50 @ $21.50 for No. 2 X, and $19 @ $20.50 for Gray Forge. These prices are f. o. b. at the port of shipment. Small spot lots will command $2 per ton higher. Freights on Pig Iron from New York to Boston are $1.50 per ton. *Foreign Pig* is firm and in fair demand at $21 @ $22 for Eglinton; $22 @ $23 for Glengarnock and Gartsherrie, $24 @ $25 for Coltness and Langloan, and $18 @ $19 for Middlesborough. *Old Rails* are firmer, and holders are generally indisposed to sell at the prices previously ruling. We quote American at $29 @ $30, and Foreign at $25.50 @ $27.50. *Manufactured Iron* is in moderate demand at unchanged prices from the stores. We quote Bars at $2.35 for Best Refined, and $2.20 for Common. We quote Norway and Swedish Iron at $4.15 for Bars and $5.15 for Shapes; Nails at $3 @ $3.15 per keg. Plates at 3¢ for Tank, 3¼¢ for C. No. 1, 3¾¢ for C. H. No. 1 Shell, and 4¼¢ @ 5¢ for C. H. No. 1 Flange. *Copper* has ruled quiet and unchanged. Ingot closes quiet and steady at 18⅞¢ @ 19¢ for Lake, and 18¼¢ @ 18½¢ for Baltimore. A moderate jobbing trade prevails at 19¢ @ 20¢ for Lake and 18½¢ @ 19¢ for other brands. There has been no change in the combination prices of Manufactured Copper. We quote: New Sheathing Copper, 26¢; Braziers', 28¢, and Bolts, 28¢; Bottoms, 31¢; American Yellow Sheathing Metal, 17¢ @ 18¢; Yellow Metal Bolts, 20¢, and English Yellow Metal Sheathing, 14¢, in bond. *Lead* is quiet and unchanged, and round lots are obtainable at $4.85 ℔ cwt., and small parcels at 5¢ @ 5¼¢. The prices of manufactures are unchanged, as follows: Bar, 6½¢; Pipe, 6½¢; Sheet, 7¢; Tin-lined Pipe, 15¢; Tin Pipe, 40¢; all less 10 % to the trade. No. 1 Solder, 11½¢. *Spelter* continues slow of sale, and we quote 5¢ for Western, and 4¾¢ for Remelted. Retail lots command ¼¢ above these figures. *Sheet Zinc* is quiet at 7¼¢ @ 7½¢. *Tin* is firmly held at 20¢ for Straits, and holders are very confident in regard to the future. The demand, however, is moderate. *Tin Plates* also show symptoms of improvement, but we continue to quote: Charcoal Bright at $6.25 $6.50, and Ternes at $5.37½ @ $5.50. Coke Tin at $5 @ $5.12½, and Ternes at $4.87½ @ $5.—*Commercial Bulletin.*

CINCINNATI.

November 8.—*Pig Iron.*—The expectation on the part of some persons that there would be an increased demand, and that prices would be higher, has not been realized. The comparative small demand, and the strong desire upon the part of some owners to realize on their stocks, has led to a decline in the prices of some kinds. This is considered to be but temporary, as the pressing stocks are supposed to be the lingerings from last year and this year's purchases by inexperienced speculators. Sales during the past week were about as follows:

	4 mos.
No. 1 Hanging Rock Charcoal Foundry	$27.00 @ .....
No. 2 Hanging Rock Charcoal Foundry	26.00 @ .....
Hanging Rock Cold-Blast Charcoal, Car Wheel	40.00 @ .....
No. 1 Hanging Rock Coke Foundry	25.00 @ 26.00
No. 1 Hanging Rock Stonecoal Foundry	23.00 @ 24.00
No. 1 Hanging Rock Silver Gray	23.00 @ 24.00
No. 2 Hanging Rock Silver Gray	22.00 @ 22.50
" Softeners "	22.00 @ .....
Hanging Rock Coke Forge Iron	22.50 @ .....
" " Stonecoal Iron	21.50 @ .....

Manufactured Iron.—Sales confined mostly to Refined and best C. C. kinds at $2.25, card rate, with liberal orders.

LOUISVILLE.

Messrs. Geo. H. Hull & Co., Commission Merchants, report to us as follows, under date of November 5: Several large sales have been booked for Iron during the last week, but the market is without change in prices. Most furnaces South are sold ahead, and have no stock on hand. The market is in a favorable condition for an advance, should purchasers come into the market to any considerable extent soon. Most manufacturers, however, are well supplied, and there is nothing to bring this extra demand soon unless buyers should anticipate an advance. We quote for cash:

FOUNDRY IRONS.

No. 1 Hanging Rock, Charcoal	$27.00 @ 28.00
No. 2 " "	26.00 @ 29.00
No. 1 Southern, Charcoal	24.00 @ 25.00
No. 2 " "	23.00 @ 24.00
No. 1 Hanging Rock, Stonecoal and Coke	24.00 @ 25.00
No. 2 Hanging Rock, Stonecoal and Coke	23.00 @ 24.00
No. 1 Southern, Stonecoal and Coke	24.00 @ 25.00
No. 2 " "	22.00 @ 23.00
"American Scotch"	23.00 @ 24.00
Silver Gray	22.00 @ 24.00
Scotch	28.00 @ 29.00

MILL IRONS.

No. 1 Stonecoal and Coke, Cold-short and Neutral	21.00 @ 21.50
No. 2 Stonecoal and Coke, Cold-short and Neutral	20.50 @ 21.00
No. 1 Missouri and Indiana Red-short	26.00 @ 27.00
White and Mottled, Cold-short and Neutral	18.00 @ 19.00

CAR WHEEL AND MALLEABLE IRONS.

Hanging Rock, Cold-blast	35.00 @ 42.00
Alabama and Georgia, Cold-blast	35.00 @ 40.00
Kentucky, Cold-blast	35.00 @ 40.00

ST. LOUIS.

Messrs. Card & Hoffer, Pig Iron and Iron Ore Merchants, 417 Pine street, write us as follows, under date of November 6: As was very natural, no business whatever was transacted for the first three days of the week. But since the result of the election has become known there has quite a lively inquiry sprung up, and already a number of trades for round lots are on the point of consummation. We quote for cash, f. o. b. here:

HOT BLAST CHARCOAL.

Missouri	$26.00 @ 27.00
Southern	25.00 @ 26.00
Hanging Rock	29.00 @ 30.00

COKE AND COAL.

Missouri	25.50 @ 26.00
Southern	25.00 @ 26.00
Ohio	27.00 @ 28.00

MILL IRONS.

Cold-short	22.50 @ 23.50
Red-short	25.00 @ 26.00

CAR WHEEL AND MALLEABLE IRONS.

Missouri	30.00 @ 33.00
Southern	38.00 @ 40.00
Ohio	40.00 @ 45.00

ORE.

Ore for fix	10.00 @ 12.00
For furnace	6.50 @ 7.50
Brown Hematites	no market.

RICHMOND.

Mr. ASA SNYDER, Iron Merchant and Furnace Agent, writes as follows under date of November 7: Market very firm, but without change in quotations:

Scotch Pig Iron	$24.00 @ 27.00
American Scotch Pig Iron	28.00 @ 29.00
No. 1	26.00 @ 28.00
No. 2	21.00 @ 24.00
No. 3	20.00 @ 22.00
Mottled and White	19.00 @ 20.00
Virginia Charcoal Wheel Iron	36.00 @ 40.00
Old Rails	25.00 @ 28.00
Wrought Scrap, No. 1	23.00 @ 24.00
Cast, Machinery Scrap	21.00 @ 22.00
Richmond Refined Bar Iron	2.6 @ .....
Horse Shoes, Tredegar	@ 4.00
Mule " "	@ 5.00
Old Dominion Nails	@ 3.25

For lots of 200 kegs, 10¢ per keg less.

BALTIMORE.

W. N. WYETH, Iron and Steel Merchant, 46 and 48 South Charles street, reports us the following, under date of November 8: Trade continues ruling much as last reported. Doubtless there will be a lack of activity until the coming new year.

Ref. Bar Iron, 1 to 6 by ¾ to 1	₩ lb 2½ @ 2¾¢
" " 1 to 4½ by 1½ to 2	₩ lb 2⅛ @ 2¾¢
" " ¾ to 2, Round and Square	₩ lb 2⅛ @ 2¾¢
Hoop Iron, 1½ wide and upward	" 3½ @ 3¾¢
Band Iron, from 1¼ to 4 in. wide	" 3 @ 3¼¢
Horse-shoe Iron	" 3¾ @ 4 ¢
Norway Nail Rods	" 6¾ @ 6¾¢
Black Diamond Cast Steel	" 13½ @ 14½¢
Machinery Steel	" 9 @ 9½¢
Cast Spring Steel	" 8 @ 8½¢
Common Horse Nails	" 10 @ 11 ¢
Perkins' Horse shoes, ₩ keg of 100 lbs	$4.37½
" Mule shoes	5.37½

	10	9	8	7	6
Putnam Horse Nails, ₩ lb	21	22	23	24	26¢
Globe Horse Nails, ₩ lb	20	21	22	23	25¢
Railroad Spikes			3	@	3¼¢

Less list discount to the trade.

W. B. BELKNAP & Co., Iron and Steel Merchants, Nos. 113 and 115 West Main street, report to us as follows under date of November 6: Business during the past week, on the whole, has been quiet, with some signs of revival the last few days. Buyers are feeling the market with a view to replenishing depleted stock, so while the selling price has not stiffened, any uneasiness for the future has disappeared and a stable market is looked for. Bars may be quoted at $2.25 @ $2.30; Light Sheets at $4 @ $4.50. There has been some cutting on Nails of about 5¢ per keg. Manufacturers express the belief that it will go no further. Price is quotably $2.85 @ $2.90 per keg for 10d. The high water admits of free shipments from Pittsburgh, which market has been shut out for several months except by rail.

Our English Letter.

Review of the British Iron, Steel, Metal and Hardware Trades.

(*From our Regular Correspondent.*)

LONDON, ENG., October 25, 1880.

THE OUTLOOK

in those branches of business on which the readers of *The Iron Age* are chiefly interested has become somewhat brighter since the date of my last week's report. The improvement is, however, tentative and expectant rather than positive, and has yet to be confirmed before the promises it holds out can be considered to have been realized. It does not appear at all clear how or why the change has come about, but it is quite likely that the key to the whole affair is supplied by the steady rise which has taken place during the week at Glasgow. In that leading center of the British iron trade the period under review has been characterized by a cheerful tone, and an amount of legitimate business which has developed increased purchases of warrants, as well as greater firmness as regards special brands of makers' iron. Beside this, the fact that stocks have decreased within the week has not been without its influence on buyers, particularly those among the general public, in spite of the large and constantly-growing output of the Scotch furnaces. That stocks should decrease in the face of so extended a production is of itself a remarkable fact, and would be considered still more noticeable were it quite clear that makers are not withholding the iron from the official stores in pursuance of some settled plan. At present no explanation on this head is forthcoming; hence it is unknown to the general public whether the iron has really been used or whether it is being held back in makers' own yards in order to minimize the quantity stored in Connal's warehouses. In any case the result is as stated, and prices are steadily moving up in consequence. Some anxiety exists as to the possibilities of the American demand, and there is even now an expectation in certain circles of renewed orders from your side, but so far as I am aware this hope is not being, nor is it likely to be, fulfilled. In Scotland, as well as in Cleveland, the altogether unprecedented activity of the shipbuilding yards is an unequivocal symptom of prosperity. Not only will the vessels newly ordered need a heavy tonnage of iron in the shape of plates, angles, tees, bulbs and so forth, but their construction will require large quantities of bolts, general iron and brasswork, and a corresponding outlay on machinery. All this gives employment to the iron trade and its allied industries, so that this greatest of Northern businesses may be deemed to have a most brilliant future before it. Work is assured for six or eight months ahead, even if not another order should be booked in the meantime, a contingency which must be deemed highly improbable. It is, therefore, pretty clear that if any revival of the shipping trade should set in we may look for a decided, and perhaps important, rise in prices. The volume of the output of crude irons is, of course, adverse to any such change under existing conditions, but the combination of circumstances now existing is sufficient, with but slight alterations in their aggregation, to warrant the prophecy I have here ventured to make. The hematite smelters are, perhaps, likely to suffer initially from the success of Bolckow, Vaughan & Co.'s new works (alluded to elsewhere in this letter), but they are for the most part so well sold forward, and the rail mills are so encouragingly employed, that they will have time to turn round prior to facing their fate. Of manufactured iron in general there is little to be said. The reduction in marked bars has somewhat unsettled matters in many quarters, and not a few of the second rate and common iron manufacturers are loud in their condemnations of the policy of the list houses, whose action in reducing prices is alleged to have induced expectations on the part of buyers which it is impossible to meet. For this and similar reasons, some of the merchants and others are said to be holding back their orders, under the impression—probably destined to be mistaken, I may say—that a further reduction will before long be necessary. For hoops there are understood to be several United States specifications floating around, in addition to the orders for that class of iron recently placed in North and South Staffordshire. Galvanized iron is also in fair request, mostly on Colonial and West Indian account. Wire is 10/ per ton cheaper on the week, and certain kinds of hardware, nails and other articles wholly of iron, are 5 to 7½ per cent. weaker. At an influential meeting of sheet-iron manufacturers of South Staffordshire and East Worcestershire, held on Thursday at Birmingham, the committee reported that, in accordance with their instructions, they had held meetings and recommended the formation of an association, to include all the sheet-iron manufacturers of the district. The committee recommended that the association should be on the basis of having a minimum price for each description of sheet iron, below which no sheets should be sold, the minimum to be subject to alterations from time to time. The prices were to be: Nail strips and 13-gauge sheets, £6. 5/ per ton; 14 to 18 gauge, £6. 10/; merchant singles to 20-gauge, £7. 5/; galvanising to 20-gauge, £7. 15/; and other descriptions in proportion for delivery in Birmingham, Walsall, Dudley and Wolverhampton, with 15/ per ton extra for delivery in London, and 10/ for delivery in Liverpool. The report was adopted, and it was decided to invite the manufacturers who have not yet signified their intention to join the association. For heavy iron foundry good orders are being booked, one for the Liverpool corporation, for instance, being for 10,000 tons "in a line." The steel rail houses now quote £6 @ £6. 5/, and iron rails are £5 @ £5. 5/ at Welsh ports. In the latter sort a rather better business is current on account of your Southern lines. Scrap is still entirely neglected and nominal.

DEPHOSPHORIZATION

in England has hitherto been very much talked of, but never accomplished on a practicable and large scale prior to the last few days. You are, of course, well aware that at Bolckow, Vaughan & Co.'s Eston Works an entirely new plant, with two 15-ton converters and powerful blowing engines, &c., has been erected, and it has been mentioned in some of my former letters that it would be run on Cleveland pigs so soon as the men should have become perfectly familiarized with the new machinery. On Monday last hematites were discarded and the converters were charged with ordinary Cleveland pig iron, on which they have since been running with the most gratifying success. I find the following account of the matter in the *Ironmonger*, the only journal, by-the-by, which seems to have any definite information on the subject:

"During the present week the crucial test has been applied, and the two 15-ton converters have been run on ordinary pure Cleveland pig iron, with the most complete and gratifying success. From the pig thus used, Thomas-Gilchrist steel has been produced in large quantities, without any hitch, and the product has been cogged down and rolled into rails in the usual way. These rails have been carefully and thoroughly tested by Mr. Thomas Harrison, the well-known chief engineer of the Northeastern Railway Company, and have passed his searching trials in the most unexceptionable manner. In conducting the tests a 'monkey' drop weighing 1800 pounds, or over three-quarters of a ton, was made use of. The rails were placed on supports 3 feet apart.

"The first blow fell 5 feet, and gave a deflection of ¼ inch. The second blow also was from a hight of 5 feet, and gave a set of ½ inch. The third blow fell 27 feet, and resulted in a set of 1¾ inch. Notwithstanding the severity of this test there was no sign whatever of fracture—a circumstance which proves the extreme ductility of the metal of which the rails were composed.

"Having so successfully passed the mechanical tests, which were the same as those ordinarily applied to English rails, the rails were submitted to chemical analysis, with a result equally satisfactory. This analysis showed the following details: Carbon, .05; silicon, .05; phosphorus, .06.

"These figures, which are absolutely authentic, must be deemed excellent, and compare most favorably with the statistics recently published by us as to the results obtained in basic operations at Hoerde and other German, Austrian and French works. Further than this, it has been proved to demonstration at Eston that there is no difficulty whatever in making steel by the dephosphorization process from common pig iron with 1 per cent. of carbon, if required. Ordinarily rails for English lines are made with about 0.35 to 0.50 of carbon, but it is an additional proof of the practicability of the new process that as much as 1 per cent. carbon may be had should it be deemed necessary.

"These tests will no doubt be deemed quite convincing by the large number of firms and persons who have been anxiously awaiting the outcome of Bolckow, Vaughan & Co.'s adoption of the Thomas-Gilchrist invention, and we may now expect to witness a further development of the idea in many other quarters."

Mr. Windsor Richards, the general manager of Bolckow, Vaughan & Co.'s establishment, is a very able man of business, and he is undoubtedly to be warmly congratulated on the marked success of his venture. No other concern in Great Britain has dared to adopt the process so far; indeed it has been openly confessed that all the rest were "anxiously awaiting the results of the experiments at Eston." These, therefore, having been successful, we may look for a general movement in the direction of the adoption of the basic process. I believe I am correct in stating that Mr. Thomas has himself been at Eston during these preliminary runs, and has assisted Mr. Richards in working the thing through, as he had previously done at some of the German establishments.

SCOTCH PIG IRON

is better on the week to the extent of 2/ or thereabouts per ton, both as regards warrants and makers' iron. According to the circular of John E. Swan & Bros., Limited, there are now 116 furnaces blowing, against 94 at this date last year. Shipments are 100 per cent. below those of the corresponding week of 1879, when the American boom had the effect of sending a vast quantity of iron to your ports which had better have remained on this side. Some of it may possibly yet remain unsold in your warehouses, so that if the current shipments be at all genuine they may be taken to represent a sounder turnover than last year's figures. To date the total shipments have this year increased by 112,624 tons. Imports of Cleveland pig into Grangemouth for use in Scotland have decreased 11,265 tons in 1880 on a total of 198,980 tons. In the official stores of Connal & Co. are now 474,787 tons, as compared with 346,592 tons a year ago and 415,625 at Christmas, 1879. Ballast pig iron is 46/ per ton, and freights to your Eastern ports range from *nil* to 2/6 per ton. Writing from Glasgow on October 23d, James Watson & Co., said: "Since the date of our last the Scotch iron market has improved in price, with a larger business doing both in warrants and in makers' iron. On Monday a firm tone prevailed and the price advanced from 50/7½ @ 51/ cash. On Tuesday the market opened strong and quickly improved to 51/9 cash, afterward relapsing to 51/4, at which it closed. On Wednesday the opening was dull at 51/1½, gradually advancing to 51/5½ per ton. Yesterday being a holiday there was no market, and to-day the feeling has been very firm, with a large business done from 51/7½ @ 52/4½ per ton, closing buyers 52/2, sellers 52/3 cash. The shipments last week were 11,196 tons, as compared with 23,323 tons for the corresponding week of 1879." We quote:

	No. 1.	No. 3.
G. M. B., at Glasgow	52/6	50/6
Gartsherrie, at Glasgow	62/6	54/6
Coltness, "	63/	54/6
Summerlee, "	58/6	51/
Langloan, "	62/6	54/
Carnbroe, "	55/6	53/
Calder, at Port Dundas	59/	52/
Glengarnock, at Ardrossan	56/	53/6
Eglinton, "	53/6	51/6
Dalmellington, "	53/6	51/6
Shotts, at Leith	62/6	54/

CLEVELAND IRON

is firmer, and well maintained at the following quotations for G. M. B. f. o. b. Tees or f. o. t., net cash:

No. 1 Foundry	44/6	No. 4 Forge	39/
2 "	42/	Mottled	38/6
3 "	40/	White	38/
4 "	39/6	Kentledge	43/

In Connal's Middlesboro' stores there are about 105,000 tons, an increase of about 2500 tons on the week. Shipments from Middlesboro' last week were nearly 28,000 tons of pig, and 2500 tons manufactured iron and steel. The official return of the accountant to the Northern Iron Trade Arbitration Board certifies the average net selling price of iron during the three months ending September 30 to have been £6. 7/1 per ton, or £6. 8/ excluding rails. The particulars given are as under:

SALES DURING THE THREE MONTHS ENDING SEPTEMBER 30, 1880, (ALL CLASSES OF IRON).

Description.	Weight invoiced. Tons.	cwt.	qr.	lb.	Percentage of total.	Average net price per ton. £	s.	d.
Rails	7,849	19	1	8	6.03	5	12	8.22
Plates	81,193	2	0	22	62.34	6	12	5.54
Bars	17,886	12	3	16	13.73	6	4	1.47
Angles	23,308	7	2	0	17.90	5	15	5.29
Total	130,238	1	3	18	100.00	6	7	0.94

SALES DURING THE THREE MONTHS ENDING SEPTEMBER 30, 1880, (RAILS EXCLUDED).

Description.	Weight invoiced. Tons.	cwt.	qr.	lb.	Percentage of total.	Average net price per ton. £	s.	d.
Plates	81,193	2	0	22	66.34	6	12	5.54
Bars	17,886	12	3	16	14.61	6	4	1.47
Angles	23,308	7	2	0	19.05	5	15	5.29
Total	122,388	2	2	10	100.00	6	8	0.01

This leaves wages unchanged. In the June quarter the average selling price was £6. 11/½, showing a reduction of 3/ per ton during the September quarter.

WEST COAST HEMATITES

are steady at rates varying about 2/ to 2/6 per ton below the following where large lots are in question:

	No. 1.	No. 2.	No. 3.
Cleator	72/6	71/	70/
Lonsdale	66/	65/	64/
Workington	66/	65/	64/
Lowther	66/	65/	64/
Moss Bay	66/	65/	64/
Harrington	66/	65/	64/
Solway	66/	65/	64/
Maryport	66/	65/	64/
Askham	65/	64/	63/

I give you these quotations because they are not to be found, to my knowledge, in any English publication. There is some little speculation as to the ultimate future, so to speak, of this class of iron in view of the more economical processes under the Thomas-Gilchrist patent. That the commoner pigs will be freely used for Bessemer steel converting would appear to be certain, but there is a strong opinion that hematites will long hold their own even in that department, seeing that they can be worked so much more readily and cheaply than phosphoriferous pigs. In any case the threatened revolution will not take place in a day, but will be the gradual work of years.

FROM SHEFFIELD

I am again in receipt of rather more encouraging tidings. Some of the published trade reports from the old steel capital are couched in extremely doubtful and halting terms. They speak of unutterable and unrelieved dullness in all directions, and give no glimpse of blue sky through the dark clouds they depict. I believe I am correct in disputing the accuracy of these reports. I think I can detect in them the "fine Roman hand" of certain manufacturers' inspiration, which is designed not to paint things in too bright colors, lest the workmen should grow restive and agitate for higher rates of remuneration. Not being an employer myself of artisan labor, or otherwise interested save as a recorder, I prefer to trust private letters, which state that trade at Sheffield is, on the whole, in a fairly healthy and prosperous condition. Some of my correspondents who happen to be manufacturers, repeatedly assure me that "they mustn't grumble." That, to my mind, is a phrase full of meaning. We Sheffielders are not, as a rule, a sanguine people, or persons given to shout without plenty of reason. When I am told, therefore, that they "mustn't grumble," I adopt the impression that they are doing very well—in a quiet way, perhaps, but still well. In several lines of trade I happen to know that such is the case. In the heavier branches of the iron and steel industries there is a tolerably full amount of work in course of being executed—indeed, there is more in hand than at any period for a couple of years past, especially as regards ship plates, deck plates, locomotive frame plates, bulbs, tees, angles, wire, charcoal and steel boiler plates, armor, rails, blooms and Bessemer rolled sorts for a great and constantly increasing variety of purposes. The principal crucible steel firms (such as Firth's, Jessops', Hobson's, Wardlow's and Peace's) are sending a respectable tonnage to your market, and some of these houses are said to have good contracts on their books yet untouched. In the file trade the manufacturers have given notice of a drop in wages of 10 per cent., which the workmen have resolved to unitedly resist. A "crisis" is consequently imminent. There is always a "crisis" on hand at or near Sheffield. In the cutlery branches there is an encouraging amount of activity, but in the table blade departments the men have started an agitation for the restitution of certain "rights" and payments which they allege were taken from them during the late period of depression.

AT BIRMINGHAM

a little more animation is reported, and the remark has equal application to the whole of the South Staffordshire and Black Country hardware district, of which "Old Brum" is the center. In some lines of goods the drop in marked iron has raised expectations on the part of consumers and other buyers, which the hardware manufacturers find it impossible to meet. This has produced a certain diminution in the number of current transactions, but the customary giving out of orders at the commencement of the new quarter has more than effected a counterpoise. Foreign and colonial indents are of increasing importance and value to manufacturers, while the home trade delays its much wished-for process of recuperation. In the wire trade of the town and district it is stated that not a few of the manufacturers are again freely availing themselves of German-made rods, which they draw down into wire of any gauges they may need. This course is stated to be cheaper and better than obtaining the rods in this country—next door to the works it may be. The rods so imported are of Westphalian make. They are made at Cologne, Dusseldorf, Hamm and elsewhere on or near the Rhine, are sent down that river and transshipped at Rotterdam; shipped over to London, Hull, Bristol or Liverpool at through rates, and appear at Birmingham below the local prices. Pretty much the same state of things obtains in the cut and wire nail trades, especially as regards the latter. These, too, are sent down the Rhine, and are to be had in London 30 to 40 per cent. per keg cheaper than the home-made articles, mostly owing to the heavy inland railway charges. Both wire and nails have again been reduced in price, with a view to meeting and checking the inroads of foreign competition.

FOREIGN.

FRANCE.

(*Moniteur des Interets Materiels.*)

PARIS, Oct. 24, 1880.—*Metals.*—Business is developing normally now, and the prospect before us is encouraging. Metals have been quite steady. We quote at the close as follows: *Copper.*—Chili Bars, 160 @ 162.50 francs the 100 kilos.; Ingots and Slabs, 165; Best Selected, 167.50, and pure Corocoro Ore, 167.50. *Tin.*—Banca, 246.50; Billiton, Straits and Australian, 237.50, and English 233.50; *Lead*, 37.50 @ 38.50, and *Spelter* 44 @ 44.50 francs. *Iron.*—The iron market is as weak as it was last week, but dealers and consumers will now soon be obliged to replenish their supplies, stocks in their hands being well nigh exhausted. Producers will then be able to dictate their own terms, which will no doubt bring about a notable improvement in values. At present Merchant Iron is still procurable at 17.50 @ 18 francs; nails are moving off very slowly; No. 12, delivered at Paris, may be had at 33 francs. In the Haute Marne Coke Merchant Iron is still quoted 18 @ 19 francs; mixed, 20 @ 21; machine No. 20, mixed, 20.50 @ 21. The foundries are quite busy, yet prices are not firm. In the Meurthe and Moselle "Affinage" Pig Iron continues to be quoted 6.50 francs. *Coal.*—Activity in this branch is kept up, and receipts and deliveries are large. Prices are sustained at this center at 50 @ 55 francs; the range of prices at la Villette is 33 @ 48; Coke, 60 francs. St. Etienne continues active, and is only kept in check by the insufficient number of freight cars of which that region is now short 200 per diem.

BELGIUM.

(*Revue Universelle.*)

BRUSSELS, Oct. 24, 1880.—*Iron.*—The outlook is still uncertain here, but producers are nevertheless of good cheer. Merchant Iron in particular still moves off slowly at 12 francs. On the other hand, Sheet Iron sells with great ease, certain species thereof in particular, which as fast as turned out are placed at once. Meanwhile, both Affinage and Moulage Pig has remained steady. Looked upon from a general point of view, the present aspect is not a satisfactory one in Belgium, for there is rather a lack of orders, but as last year and during previous ones, the demand did not spring up before the month of November, it is hoped that in a week or two a favorable change will manifest itself. We quote at the close: Merchant Iron, No. 1, 12 @ 12.25 francs per 100 kilos.; Sheet Iron, 17; Beams, 13.50 @ 14; English Pig Iron, 5.65 @ 6.10; Belgium Moulage, 6.25 @ 6.75, and Affinage ditto, 5.80 @ 6.10. *Metals* have been well sustained. We quote: Copper, 158 @ 160; Lead, 39 @ 39.50; Tin, 234 @ 235.50; Spelter, 45.50, and Sheet Zinc, 56 francs the 100 kilos. *Coal* is well supported at the ensuing rates: Mixed, 14 @ 14.50; Small, 7.75 @ 8; Block, 21 @ 22. The principal demand for this fuel is now for household purposes, in which a steady amount of activity is maintained. Small Coal for industrial wants has been only moderately inquired for, but prices have been well sustained.

GERMANY.

(*Borsenhalle.*)

HAMBURG, Oct. 22, 1880.—*Iron.*—We receive the ensuing report from Dortmund: "The tendency here is getting to be a more apathetic one every week. Only a few works are kept busy in a satisfactory manner. Among these we may mention the rolling mills turning out thick sheets and wire; in the remaining branches there are not many profitable contracts being filled just at present, nor does the Pig Iron market appear to be firmly seated. The news that the firm of Krupp has received large American orders proves to have been correct; but the intelligence that other Prussian works also got orders from the other side proves to have been without foundation. Various German railroads have now come forward with their commands, which will be attended to by adjudication, the requirements being steel rails and general material. The St. Gothard Railroad Company wants 37 locomotives. All this is, however, like a drop in a bucket in the face of the productive capacity of our region. Prices are nominally unaltered, but the moment larger orders appear concessions of no small amount are made. The sales of *Coal* are steadily on the increase; both dealers and consumers are ready purchasers, so much so that most of the Coal companies have sold all they can turn out for the winter. An advance in prices seems to be imminent." In Upper Silesia the Iron market is quiet; the rolling mills are compelled to sell low, and cannot, therefore, pay the rates for Pig Iron now asked. Coal has been fluctuating with the temperature, so far as activity is concerned; prices are steady. In Lorraine, Luxembourg and the Sarre district the blast furnaces are busy, while all other branches are becoming duller daily. Coal is more active there. *Metals.*—A good many purchases for consumption have been made. Lead remains unaltered. We quote: English Pig, 17 @ 17.50; ditto Sheet, 17.50 @ 18; German Pig, 15.25 @ 15.50; and Spanish, 19 marks the 50 kilos. Copper is firm. We quote: Drontheim, 72; English, 66 @ 68; and ditto Sheathing, 76. Tin is improving. We quote: Banca and Common English, 96 @ 98; Australian, 94 @ 96; and English Refined, 98 @ 99. Spelter has declined. We quote spot and futures, 16.50; and Sheet Zinc, Silesian, usual numbers, 23.10 marks the 50 kilos.

AUSTRIA.

(*Austrian Trade Journal.*)

VIENNA, Oct. 24, 1880.—*Iron.*—The situation of the Iron market has become quite a precarious one in Austria. On the one hand, prices have been ill-sustained abroad; and on the other, dealers have been holding back; nor have our railroads bought as liberally as had been counted upon. In consequence of the low figures at which Merchant Iron has been offered from Upper Silesia and Hungary, the Bohemian and Austrian works have been compelled to reduce their rates correspondingly, but this has not been inducement enough yet, and has provoked no increased demand from dealers and consumers, which is a great disappointment indeed. Old Rails are procurable at 5½ florins per 100 kilos. A moderate demand prevails for Hardware and agricultural tools. Foundries and smaller machine shops are tolerably busy. Steel for export is moderately active. We hear that the Werndl Arms Manufactory has received an order for 2,000,000 muskets from the Chinese government. Iron has been dull in this market and remains nominal at ensuing rates: Pig, 50 @ 60 florins per ton; Merchant Iron, 105 @ 125; Sheet Iron, 160 @ 190; and Pillars, 123 @ 125 florins. Metals have fluctuated very little during the week; we quote *Copper* at the close, 65 @ 75 florins the 100 kilos.; *Tin*, 112 @ 115; *Antimony*, 82; *Lead*, 22; *Shot*, 24.50 @ 26.50; *Spelter*, 20 @ 22; *Sheet Zinc* nominal; *Nickel*, 4.50 per kilo. *Blue Vitriol*, 32, and *Green* ditto, 4.80 @ 6 per 100 kilos.

HOLLAND.

(*Koch & Vlierboom.*)

ROTTERDAM, October 26, 1880.—*Tin.*—The firm feeling alluded to in our last report has continued to prevail, although at times momentarily interrupted. Banca has been paid to-day 53.50 guilders the 50 kilos., and Billiton, 53.

CHILI.

(*Ferrocarril.*)

VALPARAISO, Sept. 10, 1880.—*Copper.*—A cargo of Lota sold at $23.45 per quintal on board, while for choice brands $23.60 has been paid. On shore prices fluctuate between $23 and $23.20 as per brand. With lower quotations from London, the market has since become flat. Sales, 22,261 quintals. Of Regulus a cargo was taken at $20.50 on board. Ore inactive; we quote the same $4.30 for 25 %. *Nitrate* has been dull and a little lower. The Senate proposes a duty of $1.30 per 217 pounds instead of $2 proposed by the Chambers; compromise between these extremes is likely. The government has notified the Tarapaca producers that the monopoly will cease 30th inst., just when all Nitrate will pay the duty agreed upon. Sales, 89,000 quintals at $4.41 @ $4.55 for 95 and 96 %. *Exchange*, 60 days, 25 3/8d.; 90 days, 25¼d.

The Furnessia, a new monster steamer launched by the Barrow Iron Shipbuilding Company, at Barrow, a short time ago, is, with the exception of the Great Eastern, the largest ship afloat. The Furnessia is 445 feet in length between perpendiculars, 44 feet 6 inches beam, 34 feet 6 inches depth of hold, 5500 gross tonnage, and 9900 tons displacement of water when drawing 26 feet. She is to be brig-rigged, with two funnels. Her engines are of the inverted, direct acting compound surface-condensing type. The high-pressure cylinders are 49 inches, and the low-pressure cylinders are 100 inches in diameter, with a stroke of 5 feet 6 inches. The pressure of steam is 90 pounds to the square inch, and this is generated by four double-ended boilers, having in all 24 furnaces. The propeller is 20 feet 6 inches in diameter. The new vessel was built for the Anchor Line, by which it will be run between New York and Glasgow.

We learn by direct inquiry that the report that General Dodge was preparing to resume the manufacture of tin plates in this country is incorrect. He is interested in mining enterprises, and besides, is concerned in an electric motor, of which more will be heard very soon. By it machinery is said to be run successfully at a distance of many feet from the electric generator, and the best results are confidently predicted.

We learn that the Oregon Improvement Company, which is wholly distinct from the Oregon Railway and Navigation Company, have arranged with John Roach for two 3000-ton iron steamers, to be employed as colliers on the West Coast. The coal deposits are in Washington Territory, and the supply is very large.

INDUSTRIAL ITEMS.

MASSACHUSETTS.

The Mason Machine Company, of Taunton, employ at present over 750 men. Besides their constant and extensive manufacture of locomotives and all kinds of cotton machinery, they are turning out every day one of the now famous Campbell printing presses.

Reed & Barton, the well-known silver and plated-ware manufacturers, of Taunton, are just completing two large additions to their already immense manufactory—one 40 x 152, four stories high, and the other 70 x 38, three stories, both of brick and with French roofs. This company now employ over 600 hands.

The Porter Needle Company, of Watertown, with a capital of $100,000, and the Knott Refrigerator Company, of Boston, with a capital of $300,000, have been chartered.

The Taunton Iron Works are employing 100 men, and are making 200 stoves and ranges per week, besides hollow-ware of various kinds.

The Weir Stove Company, of Taunton, are making 135 stoves per week, and give employment to 45 men.

The United States Circuit Court of Massachusetts has enjoined, *pendente lite*, the B. D. Washburn Mfg. Co., from continuing an alleged infringement of Shedd's patent for a steel spring wire blind fastener, unless the defendants file bond for $5000 for damages and costs, and meanwhile keep a correct record for purposes of accounting.

NEW YORK.

Messrs. Nye & Co. are building for their tenants, Messrs. L. M. Woodcock & Co., founders and machinists, an addition which will nearly double the size of the shop.

The various parties in the field with electric lights maintain a sharp rivalry, and are gradually adding to their business in supplying the rising demand. The United States Electric Lighting Company, in which Mr. Hyde, of the Equitable Life Insurance Company, and Mr. Hartley, of the firm of Hartley & Graham, are particularly active just now, claim a full share of public attention. They have bought all the patents of Prof. Farmer, who has given much attention to illuminating by electricity for several years past, and are now enlarging their establishment on Sixth Avenue and Twenty-Fifth street, in order to meet the demands upon them. They report that the orders already accumulated will engage their force for several months to come. Some half-dozen residences up town are being fitted with the electric light, besides a number of mills, foundries, &c. It is stated that the company use both the voltaic arc and incandescent systems, confining themselves to no particular patents. Prof. Farmer lighted his residence at Salem, Mass., with electricity as long ago as 1859. He used the incandescent light, sub-dividing the current, and worked with a battery and automatic regulator. From that time until now he has been perfecting the system, but has not pushed his inventions on the market. Associated with him are several well-known inventors.

Mr. W. H. H. Gere, of Syracuse, president of the Gere Iron and Mining Company, whose charcoal blast furnaces are located at Port Leyden, Lewis County, writing to the *Bulletin of the American Iron and Steel Association*, says: "We fired one of our furnaces—the Gracie—on the 14th of October. With the enlargement of the furnace to 10 feet bosh and 50 feet in hight, we hope to so increase the product as to equal the most approved charcoal furnaces. We shall have the Fanny ready in about 60 days." These furnaces were formerly the property of the Black River Iron and Mining Company.

PENNSYLVANIA.

At present there are about 500 hands employed at Cramp's ship yards on the Delaware, a number that will soon be increased daily to meet the demands of new work already ordered or expected. The contract was signed on Monday last for a large iron propeller steamship for John Dallett & Co., extensive shipowners of this city, to be built according to the regulations of the English Lloyds, and to be ready for service in about six months. She will be 250 feet long, 35 feet beam, and 21 feet deep, have a carrying capacity of 1800 tons, and be furnished with compound surface-condensing engines, to be built by Messrs. Cramp. An iron propeller passenger boat, 125 feet long, 20 feet beam, and 9 feet depth of hold, similar to the Gratitude, now plying on the Delaware, and intended for similar service or for use in Southern waters, is under way, and rapidly approaching completion. Two new boilers, 12 feet 6 inches in diameter and 17 feet long, capable of being fired at both ends, for the steamship Vaderland, of the Red Star line, have just been finished, and will be put aboard that vessel on her arrival. These boilers have shells 1 inch in thickness, are the heaviest built in this country for the service, and have been tested to 150 pounds water pressure. Two new boilers, 11 feet long and 11 feet diameter, with shells 13-16ths thick, have just been built and placed in the new steamer Delaware, of Clyde's line.

At the annual meeting of the stockholders of the Mellert Foundry and Machine Company, Limited, of Reading, held at their office on the 6th inst., Messrs. Wm. H. Ainey, George Burke, Isaac Fegley, Henry S. Eckert, H. K. Hartzell, Arnold Mellert and D. P. Wanner were re-elected managers for the ensuing year. The board then reorganized, re-electing Mr. Ainey as chairman, Mr. Wanner as secretary and treasurer, and Mr. Mellert superintendent. The works have been kept busy during the past year on cast-iron gas and water-pipes, retorts, car castings, turbine water-wheels, machinery, &c., and the prospects of the business for next year are considered extremely good.

The Pottstown *Ledger* says: On Sunday morning, the 31st inst., the Warwick Iron Company's furnace went out of blast again, this being the seventh time since the lighting of the furnace on the 19th of April, 1876. On Saturday afternoon the pipes began to choke up with cinder, which could not be forced back by the blast, and at 5 o'clock on the following morning the blast was withdrawn and hopes of saving the furnace given up. Mr. P. L. Weimer gave it as his opinion that relighting can be done with comparatively little expense. The news of the chilling of the furnace was quite a surprise, as, after considerable repairs, it was supposed to be working all right. The furnace has been in charge of Mr. Edgar S. Cooke since December 27th, 1877, when it made the remarkable run of 750 days, making 38,000 tons of pig metal in that time.

The new rolling mill of Kimberly, Carnes & Co., in Greenville, built on the site of the one burned, will soon be ready for operation. It will be far superior to the old one, many improvements being added, and will have 20 puddling furnaces and 4 heating furnaces.

At Sharon, both mills and nail factories are now running full time, with numerous orders ahead.

The Crystal Palace Stove Foundry, of Bridgewater, has been sold to a Mr. Haney, of Allegheny City. Jacob Anderson, Jr., will be the manager of the works in the future.

The coal product of the Schuylkill region for the week ending October 23d, was 175,621 tons, as against 174,772 tons for the week previous and 165,942 tons for the corresponding week of last year. The total product for the week was 639,870 tons, against 607,832 tons for the same week of last year, an increase of 29,038 tons. The output for the year so far is 18,540,744 tons, against 21,233,844 tons for the corresponding period of last year, a decrease of 2,693,100 tons.

At Hartman's plumbago works, Chester Springs, a furnace is to be built which is to be 30 feet long and 8 feet wide, in the middle of which will be a large boiler. It will require about 10 tons of castings to build this furnace, 6 tons of which have already been delivered. The mill will soon be in readiness for operation.

The Colebrookdale Iron Works, Breulinger & Co., proprietors, continue to manufacture large quantities of sad irons. Nearly a car load was forwarded last week to Texas and California. In addition 22 casks and one box were consigned to Mobile, Ala., and 18 casks to Boston, Mass.

John W. Eckman, of Port Kennedy, commenced on Wednesday morning the shipment of 800 tons of pig iron, which had been held under orders contingent on the result of the election.

The Glenden Iron Company's No. 1 furnace has been blown out for repairs.

The new No. 3 furnace of the Crane Iron Works, at Catasauqua, was lighted on the 30th ult. This is one of the furnaces which has been in course of construction the past year, and furnished with every modern improvement. It is cylindrical, without the massive stonework of its predecessor; 60 feet in hight and 16 feet bosh; the blast being supplied by three modern Whitwell stoves, each 18 x 60 feet, draft for which is furnished by the stack, 180 feet high.

During the month of October, there were manufactured at the nail works of E. & G. Brooke Iron Company, 18,120 kegs of "anchor" brand nails. For the same period last year the firm sold 17,400 kegs of nails. The markets for this immense product were found principally in New York, Philadelphia, San Francisco and Galveston. In the month of September the amount of nails turned out was somewhat in excess of the figures for October. This, however, is accounted for by several stoppages for repairs.

Messrs. Grinder, Springer & Co., of the Royersford Iron Foundry, have commenced the manufacture of stoves and hollow-ware, and are now running with 27 hands, having commenced in March last with nine. They have orders now on hand that will keep them busy until after the holidays, and are constantly receiving more.

The Simmons Hardware Company, of St. Louis, one of the largest establishments of the kind in the country, have just sent to Mr. C. F. Wolfertz, of Reading, an order for 2500 dozen pocket knives. The order sent by the Simmons Company on the 19th of August for 700 dozen knives has not yet been filled. When this last order is filled Mr. Wolfertz will have made for this firm 3550 dozen pocket knives. Mr. Wolfertz's cutlery works have never been run to such a capacity as now. Twenty-five hands are employed, who work thirteen hours per day, and a number of extra hands will be put on this week.

The stove works of Thomas, Roberts, Stevenson & Co., at Quakertown, were destroyed by fire on Tuesday morning the 2d inst. The loss is estimated at $140,000; insurance, $40,000.

The Bessemer Steel Works, at Bethlehem, during the week ending October 2d, with two converters, turned out 2909 gross tons of Bessemer steel ingots.

PITTSBURGH AND VICINITY.

Certain Wheeling nail manufacturers have been in Connellsville looking for a suitable site for the erection of a furnace and a nail mill. One of their number now owns the coal under the Buttermore Johnston tract, on Mounts Creek, in the township, and has contemplated the erection of a nail mill there ever since its purchase several years ago, the only thing in the way being the exorbitant figure asked for land on which to build the works. The Connellsville *Courier* thinks a works will soon be erected there.

The new Furnace "C" of the Edgar Thomson Steel Company, Limited, has been blown in.

Mr. H. L. Rankin has sold his eighth interest in the Mt. Braddock Coke Works, in Fayette County, to Robert Hogsett for $15,000.

Some Pittsburgh capitalists are talking of erecting a hoop iron mill at Leetonia, Columbiana County, Ohio.—*Exchange.*

The St. Louis *Post-Dispatch* prints the following: This from a boatman: Two 4-boiler boats run on the Monongahela, between Brownsville and Pittsburgh, and their fuel costs only $30 per month. The explanation is this: They burn slack coal, and the mine owners, being prevented by law from dumping it in the river, prefer to put it on flat boats, instead of burning it. The steamers referred to each pay a man $30 per month to take care of flats and the slack. This is one reason why steamers are operated at a smaller expense on the Monongahela than they are at Vicksburgh and New Orleans. There is a big difference between paying $120 per day for fuel and $30 per month.

OHIO.

Joel Hayden, who for so many years controlled the Haydenville (Conn.) Brass Works, has gone into a similar business at Elyria. A stock company has been formed under the name of the Hayden Company, and several men from the Haydenville Brass Works have gone to work for the new concern.

Lee Furnace, on Monday Creek, is averaging 210 tons per day.

Bed plates for the new blooming mill at the steel works, Newburgh, are being cast at the blast furnace casting house. There will be 9 plates in all, averaging from 8 to 12 tons each.—*South Cleveland Advocate.*

Warwood's Rake Factory, Martin's Ferry, is running to its full capacity, crowded with orders.

The Columbus Rail Mill is working 10 boiling furnaces single and double turn.

The Standish Chain Works, of Cuyahoga Falls, are running to their fullest capacity. Forty new hands have been advertised for.

Witman's Foundry, at Ironton, turns out 15 stoves a day.

Monitor Furnace, making car wheel iron, is making an average of 56 tons per week.

The electric light has been tried at the Buckeye Works, Akron, with splendid success.

Union Furnace is now making 13 tons cold-blast car wheel iron per day.

The N. Y. & O. I. & S. Co. are placing an annealing furnace in their mill. Lambert's foundry has constructed a huge flask, in which to cast the box weighing about 8000 pounds.—*Ironton Register.*

A 2-story 35 x 75 feet factory is being erected in Cleveland by the Chisholm Steel Shovel Works. This enlargement will double their capacity.

No. 2 furnace, of the Brier Hill Iron and Coal Company, Youngstown, will shortly be blown out. No. 1, which is the largest furnace in the Mahoning Valley, is nearly completed.

Big Ætna shut down last Friday, for want of coke. It is probable that fuel will be received soon, and the furnace will blow in again about the 1st of December. They have some 600 or 700 tons of metal on hand. —*Ironton Register.*

The Revolving Scraper Company, of Columbus, after some delay, in consequence of pressing orders for their goods during the whole of this year, have succeeded finally in completing their new and splendid Columbus steel scraper. After much experience in the manufacture of road scrapers, and having attained a perfect knowledge of the wants of consumers of this class of implements, they have perfected an entirely new scraper, possessing the strongest points of merit, combining great strength and durability with lightness in both weight and draft. One of the most novel features of this implement is the fact that the bowl is made in one piece from a single sheet of steel, without a joint, seam or rivet, and being in the most practical shape for rapid and effective operation. There are in connection with this scraper no useless wood backs, stays, rods or braces to get out of order or break, as are employed in all other scrapers. This scraper being made entirely of steel, is very light, and having more cutting surface than any scraper heretofore in the market, will fill with much less draft than any other. Its corners being round, and having one continuous curve from the center up the sides and around the back, gives it greater strength and capacity than those heretofore introduced. Its surfaces, outside and inside, being very hard and smoothly finished, gives it the capacity of dumping and cleaning perfectly, thereby obviating the necessity of stopping to scrape or clean it even in very wet soil. These scrapers are made in three sizes, the capacity of each size, ranging from 3 to 7 feet of earth, being fully explained in a descriptive and illustrated circular recently issued by the company. The company inform us that their business has never been so good as it has been this year, and that they are obliged to run partly at night in order to keep up with orders. They also manufacture a full line of railroad, canal, stone, wharf, pig metal, mortar, garden and farm wheelbarrows, with the celebrated Jacobs wheel; and, also, railroad and other steel plows.

Recently the stove finishers at the works of W. C. Davis & Co., in Cincinnati, formed an association for the purpose of regulating the prices of stove finishing. At a more recent date, Messrs. Davis & Co., needing another hand in that department of their works, employed a mechanic who perfectly understood filing and machine work in general, but not being a regular stove finisher the men assembled together and demanded his discharge on this ground. In the absence of Mr. Davis the man was discharged, which would not have been the case had Mr. Davis been at home. What the result of this affair will be remains to be seen.

ILLINOIS.

The Excelsior Iron Works have a contract on hand for supplying 26 tubular boilers, each 5 feet in diameter and 26 feet long, to be constructed of Otis steel. They have also recently sold to the Union Pacific Railway two small hoisting engines and boilers. These engines are 8-inch bore and 12-inch stroke. They are also constructing several barbing machines for barbing fence wire for the Lyman Mfg. Co., and a 50-horse power boiler for F. Patzack, of Grand Crossing. The Excelsior Iron Works Company have recently added new tools and valuable machinery to their already extensive works, and are now employing 240 hands.—*Chicago Industrial World.*

The census return of manufactures at Rock Island shows 107 establishments, employing 1474 hands, and producing $2,690,921. The wages paid last year were $505,674.

The Duffy Tool Company, South Chicago, have recently added to their works considerable new machinery. They report business brisk, being two months behind their orders.

The Bottle Company, at Ottawa, by the introduction into their furnace of new pots of their own make, much larger than the originals made for them by the Window Glass Works, have greatly increased the capacity of the works, and are now turning out about 70 gross per day instead of 50, as at first.

The movement for the establishment of a large plow factory in Elgin is meeting with considerable success. The committee appointed for the purpose of raising funds report the prospect very good.

The file factory at St. Charles, formerly owned by J. P. Doig & Co., has been sold to a stock company. New and approved machinery is to be added and every facility that increased capital will afford will be given to the institution, which at present employs about 20 hands.

The Smith and O'Leary Steam Hammer Forge Works, of Chicago, have started their steel casting annealing furnace. Its capacity is 5 tons per week.

The Chicago Car Axle Company, South Chicago, are building an addition of 120 x 50 feet to their steam forge works and adding new furnaces and machinery. A side track from the new Western Indiana Railroad is being built, to pass within a few feet of their works. In the manufacture of car axles, 10 tons of iron and 20 tons of coal are consumed per diem. They employ 75 hands and run their gangs day and night. The works cover 1½ acres.

The Centralia Nail and Iron Works, which have been idle for some time for the want of water, are now in full operation.

MICHIGAN.

The Wyandotte blast furnaces are now turning out 22 tons of ore daily.

Operations at the West Republic Mine, adjoining the world-famous Republic, have already developed a vein of excellent ore, 45 feet long by 5 feet in width, and the prospects for the subsequent development of a large mine on the property are indeed flattering. Republic bids fair to be, in the near future, the most active mining center on the peninsula.

MISSOURI.

We take the following from the *Age of Steel*, regarding the industries of St. Louis: William Ellison's Phœnix Iron Works are constantly kept full of work of a miscellaneous character. The Missouri Car and Foundry Company continue as busy as ever manufacturing different styles of freight cars. A very large number of workmen are employed both in the car shops and in the foundry. Helmbacher's works are being run full time manufacturing merchant iron, railroad work, car axles, &c. Conrad Siebel's copper works are among the busiest places in town—probably the most busy. Geo. J. Fritz' Central Iron Works are being run full time on miscellaneous work. McDonald's rolling mill is being run full time manufacturing car axles.

Messrs. Albert C. Trivett, jr., and Wm. A. Rogers have withdrawn from the firm of E. L. Harper & Co., and opened a new pig iron commission house, under the style of Rogers & Trivett, at Nos. 8, 9 and 10 Wiggins' Block, St. Louis.

VIRGINIA.

There are now six furnaces in operation along the line of the Chesapeake and Ohio Railroad west of Staunton: Buffalo Gap Furnace, making 11 tons per day; Grace Furnace, at Ferrol, making 15 tons per day; the Lucy Selina Furnace, at Longdale, making about 30 tons per day. (Another furnace at this point is in process of construction). The Callie Furnace, near Williamson's, making 15 tons per day; Lowmoor, at Lowmoor, in Alleghany county, making 75 tons per day, to be soon increased to 100 tons; the Quinnimont Furnace, West Virginia, producing about 30 tons per day. These furnaces all use coke made in West Virginia. This is merely the beginning of the iron industry in this section.—*Valley Virginian.*

WEST VIRGINIA.

The Top Mill, Wheeling, is on in all departments, except the furnaces, which will be blown in within the next fortnight. Large quantities of coke and ore are now arriving, and filling in will begin at once. The capacity of this furnace heretofore has been about 70 tons per day, but during the summer important changes and alterations have been made, and it is now expected there will be an increase of 25 per cent. per day, or 17 tons.

DISTRICT OF COLUMBIA.

Bids for the iron work on the roof of the north wing of the new State, War and Navy Department Building, at Washington, were opened recently as follows: Dwight & Hoyt, Springfield, Mass., $87,000; Phœnix Iron Company, Trenton, $90,933; Bartlett, Haywood & Co., Baltimore, $75,517; Passaic Rolling Mill Company, Paterson, N. J., $78,645; J. B. & J. M. Cornell, New York City, $72,130; Phœnix Iron Company, Philadelphia, $81,334. The award has not yet been made.

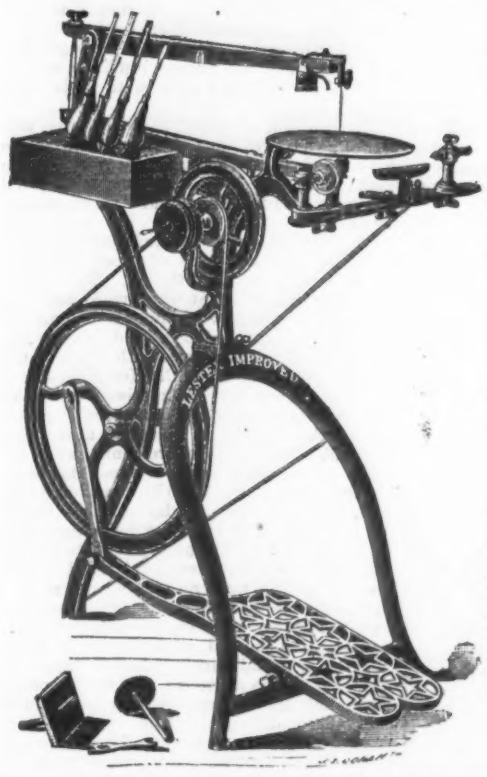
TENNESSEE.

James C. Warner, John P. White, Percy Warner and J. P. Williams have incorporated themselves under the general incorporation law of Tennessee as "The Warner Iron Company." The gentlemen are all of Nashville and have large investments in Chattanooga, North Georgia and Middle Tennessee. They will at once erect a cold-blast charcoal furnace in Hickman County, designed to produce a high grade of metal from the fine brown hematite ores of that region.

An Electric Hammer.—Messrs. Siemens & Halske, the well-known German electricians, have brought out a novelty, the electric hammer. The device consists of three hollow coils of insulated wire, having a movable core or rod of soft iron which is free to move up and down under the axial attraction of the coils when a current circulates in them. The central coil is traversed by a constant current, which magnetizes the rod or hammer, and the two extreme coils are traversed by alternating currents from a dynamo-electric machine in such a manner that they alternately attract and repel the magnetic rod up and down so as to make it beat like a hammer. The range of blow is limited on one side by a spiral spring placed within an elastic cushion. Of course a very great rapidity of action can be given to the hammer, while the arrangement is apparently applicable to working a rock drill.

A New Oil Can.—A New England man has lately invented an illuminating oil can. It is so arranged that the can holds the light and the oil and is adapted for oiling machinery in the dark, and when in use the light, which is made after the bull's-eye pattern, strikes upon the point of tube that ejects the oil and enables the oiler to see just what he is doing. Its usefulness to locomotive engineers for oiling engines in the dark should make it a valuable tool for them. The oil cannot harden or become stiff, as the light in the can furnishes heat enough to keep it warm, and it can easily be carried in one hand. Different sizes, intended for all kinds of work, will be made.

THE LESTER SCROLL SAW.



Scroll Saws are now as staple in Hardware stores as nails, and are kept in stock by most dealers. They are in demand everywhere, and make trade lively about Christmas time when it would otherwise be dull.

The Lester Saw

Is the most perfect one in use, and embraces a Scroll Saw, Circular Saw, Drilling attachment with drills, Turning Lathe and tools, solid Emery Wheel, Patent Dust Blower, Patent Saw Clamps, Tilting Table, Wrench, Screw Driver, Designs, extra Saw Blades, &c. It has a black Japan finish with red and gold stripes and nickel-plated Table. List price, complete, $10.

Rogers Saw

Comprises Scroll Saw, Drilling attachment with drill points, Dust Blower, Tilting Table, Patent Clamps, Wrench, extra Saw Blades, Designs, &c. Finish same as Lester Saw. Price, $3.50.

Cricket Saw.

This Saw has the same general appearance as the Rogers Saw, but is lighter and has no Drilling attachment or Dust Blower. Finish same as the other Saws. Price, $2. It is by far the best $2 Saw in the market.

All our Saws are made of iron with steel working parts. No charge is made for boxing.

Millers Falls Co.,
74 Chambers St.,
NEW YORK.

HEATON & DENCKLA,

Hardware Commission Merchants,

507 Commerce Street, Philadelphia.

E. & G. BROOKE'S "Anchor Brand" Nails, Brads, Spikes, &c.
MALLORY, WHEELER & CO.'S Door and Pad Locks.
UNION MANUFACTURING CO.'S Butts.
AMERICAN SCREW CO.'S Screws.
D. R. BARTON TOOL CO.'S Edge Tools, &c.
FRANCE'S Shutter Holders.
Anti-Window Rattlers, Brass and Nickel-Plated.
WESTERN FILE CO.'S Cast-Steel Files.
AMERICAN SHEAR CO.'S Shears and Scissors.
H. M. MYERS & CO.'S Shovels, Spades and Scoops.
STEELE & SONS' Wrought Handle Sad Irons.
EXCELSIOR MILLS, Genuine Turkish Emery.
BROWN & BRO.'S Brass and Copper Wire, Rivets, Spoons, &c.
GAYLORD MANUFACTURING CO.'S Till, Chest and Cupboard Locks.
AMES' Genuine (A) Chester Emery.
COLWELL & COLLINS, NORWAY BOLT CO., Norway Carriage and Tire Bolts.
PLYMOUTH MILL CO.'S Black and Tinned Iron Rivets.
AMERICAN MACHINE CO.'S Fluters, &c.
STUART, PETERSON & CO.'S Tinned and Enameled Ware, &c.
HUSSEY, HOWE & CO.'S Bar & Sheet Cast Steel.

Also a large line of Heavy and Shelf Hardware.

Providence Tool Co.,

PROVIDENCE, R. I.

SCRAPERS,

FOR SHIPS, ICE, FLOORS, WALLS, CEILINGS, &c.

Prices furnished on application.

HENRY B. NEWHALL,
105 Chambers St., New York Agent.

Handles for Manufacturers.

SELECTED STOCK,
SEASONED THOROUGHLY,
WELL MADE.

Orders solicited from close buyers who want good work.

RIPLEY MANUFACTURING CO.,
Unionville, Conn., U. S. A.

MANUFACTURERS OF

Common Mouse Traps, Porcelain Lined Lemon Squeezers, Mallets, Rosewood Faucets, Steak Hammers and Housefurnishing Ware.

DAVID HYMES & CO.,

92 CHURCH STREET, NEW YORK,
MANUFACTURERS' AGENTS.

Bargains in Hardware & Cutlery.

Low estimates made on all kinds of **SMALL CASTINGS**, in the **Rough, Japanned** or **Varnished.**

NATIONAL Horse Nail Co.

MANUFACTURERS OF

FINISHED

(BRIGHT OR BLUED)

These nails are made of the best brands of **NORWAY IRON,** and are guaranteed to be equal to any in the market.

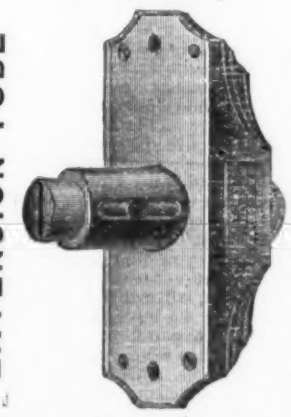
NATIONAL HORSE NAIL CO.,
VERGENNES, VT.

DURRIE & McCARTY, Agents,
No. 97 Chambers St., New York

A. E. DEITZ,

(Successor to Barnes & Deitz,)
Manufacturer of
Store Door Locks, Night Latches, Padlocks, Drawer Locks, &c., with Flat Steel Keys.

EXTENSION TUBE



STORE DOOR LOCK, No. 184.

Durrie & McCarty, Agents,
97 Chambers & 81 Reade Sts., New York.

WALKER'S

Forged Horse Shoes,

SHOENBERGER'S

Patent Toe Calks,

Superior to any in market.

Send for prices and samples.

A. BUSSING, General Agent,
4 Warren St., New York.

Peckham's "NEW IDEA"

3 lb. Mica Package for 1880.
PRICE REDUCED.

Put up expressly for Retail Dealers who desire to buy small quantities and a variety of desirable and saleable sizes. Put up in a neat and attractive Show case.

TWELVE SIZES OF MICA,

Of the very best quality.

¼ lb.....3X6	¼ lb.....2¾X4¾	¼ lb.....4¼X6
¼ lb.....4X5	¼ lb.....2¾X3⅝	¼ lb..... 3 X3
¼ lb.....4X7	¼ lb.....3 X5	¼ lb.....3¼X4
¼ lb.....2X3	¼ lb.....5 X8	¼ lb 2⅝X3⅛

PRICE, **$8.00.** Net cash. No discount.

This Package sent FREE by express or mail to any part of the United States.

J. S. & M. PECKHAM, Utica, N. Y.,
Miners and Wholesale Dealers in North Carolina Mica.

RIEHLÉ BROS.

STANDARD

SCALES

AND

TESTING MACHINES

OF ALL VARIETIES. SEND FOR PRICE LISTS.
Office and Works, 9th above Master, Store, 51 and 52 South Fourth St. Philada.
NEW YORK, 91 Liberty Street.
PITTSBURGH, 40 Penna. Ave.
G. V. HALLIDAY & CO., Agents, North 4th St. St. Louis, Mo., and New Orleans, La.

TINIUS OLSEN & CO.,

STANDARD SCALES

AND

TESTING MACHINES.

Manufacturers of Olsen's Little Giant Testing Machine, and Improved Railroad, Wagon and Furnace Charging Scales.

Office and Works, N. W. cor. 12th and Buttonwood Sts., Philadelphia.

R. C. PURVIS,
Manufacturer of
Octagon Tea Pots.

Rear of 407 Cherry St., Philadelphia, Pa.
Send for Price List.

Established in 1839. *Formerly L. & A. G. Coes.*

L. COES & CO.

Manufacturers of L. Coes'

GENUINE IMPROVED AND MECHANICS

Wide Bar Full Length. Wide Bar Full Length.

Patent Screw Wrenches

UNDER PATENTS DATED

JUNE 26, 1866,
MARCH 23, 1869,
REISSUED 1870.
NOVEMBER 10, 1863,
FEBRUARY 23, 1864,
REISSUED JUNE 1, 1869,
IMPROVED AUG. 1, 1877.

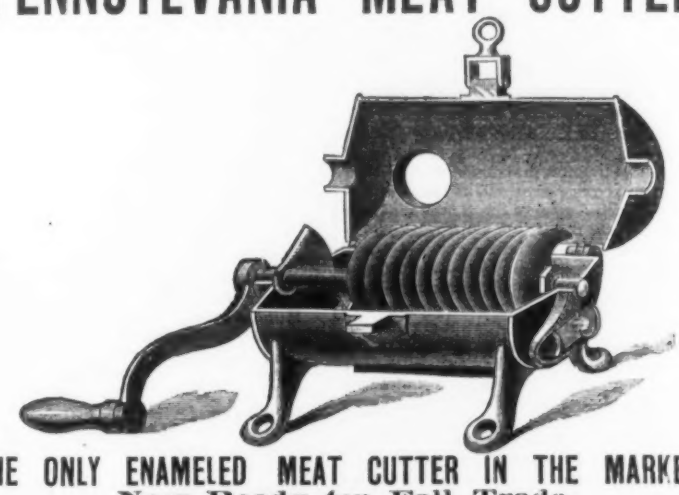
The back thrust when in use borne by the SHANK instead of the Handle

None genuine unless stamped "L. COES & CO."

WORCESTER, MASS.

Warehouse, 97 Chambers St. & 81 Reade St., N. Y
DURRIE & McCARTY, Sole Agents.

PENNSYLVANIA MEAT CUTTER.



THE ONLY ENAMELED MEAT CUTTER IN THE MARKET.
Now Ready for Fall Trade.
PRICE LIST.

No. 1, containing 8 Steel Knives, per dozen	$24.00
No. 2, " 12 " " " "	30.00
No. 3, " 13 " " " "	36.00
No. 00, Enameled for Family Use, with Screw Clamp, to screw on table, per dozen	28.00

Discount to the trade, 50 per cent. For sale by

LLOYD, SUPPLEE & WALTON, Philadelphia.
DURRIE & McCARTY, New York.

ALSO,

PENNSYLVANIA LAWN MOWER, 1880.

BUCK BROTHERS, Millbury, Mass.

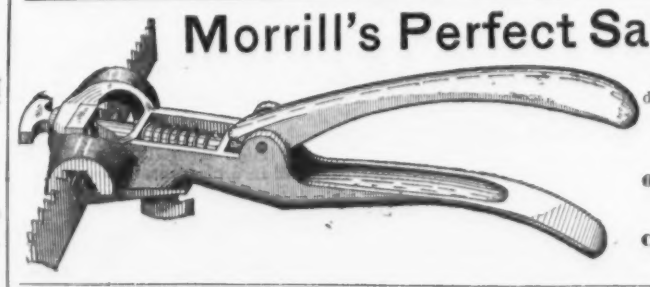
The most complete assortment in the U. S. of

Shank, Socket Firmer and Socket Framing Chisels,

PLANE IRONS.

CAUTION.—Buyers should be on their guard and not have inferior goods palmed on them by unprincipled persons, who represent them as our make. Our tools are stamped "BUCK BROTHERS," and our labels have on our trade-mark, also "Riverlin Works."

Morrill's Perfect Saw Sets.



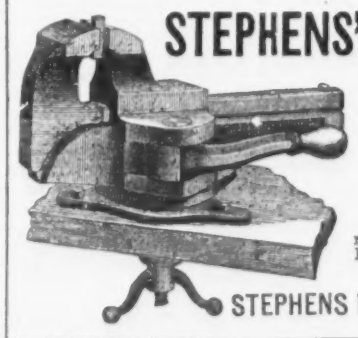
For price lists and discounts, address

ASA FARR,
64 College Place,
corner of
Chambers Street,
New York.

STEPHENS' PAT. VISE

AND ATTACHMENTS,

Stationary and Swivel Bottoms.



Adapted to every variety of work, from jewelers to locomotive works. Opens FURTHER, holds FIRMER is HEAVIER and MORE DURABLE than any other Vise. For sale by the Hardware trade.

STEPHENS PAT. VISE CO., No 41 Dey Street, New York.

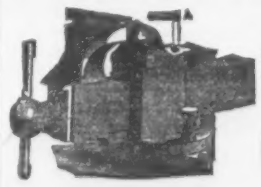
BRANCH OFFICE,
46 & 48 West Lake St., CHICAGO, ILL.

Bradley's Cushioned Helve Hammer

Awarded first premium, Silver Medal, at American Institute Fair, 1873; Cincinnati Industrial Exposition, 1874 and 1880, and the Diploma of Honor and Grand Medal of Merit at the Centennial Exhibition in 1876, being the highest award given any goods of their class in America or Europe. It has more good points, does more and better work, takes less power, costs less for repairs, than any Hammer in the world. Guaranteed as represented. Established 1832.

BRADLEY & COMPANY, Syracuse, N. Y.

PRENTISS PATENT VISES



ADJUSTABLE JAWS,
Stationary & Patent Swivel Bottoms
ADAPTED TO ALL KINDS OF VISE WORK.

HALL MFG. CO., 23 DEY ST., NEW YORK.
Send for Circular.

(*Continued from page* 15.)

their price list tells us that the sizes marked in bold face type are the sizes in use in their own shop. These sizes are: 10, 12, 15, 18, 20, 23, 25, 28, 30, 32, 35, 37, 40, 42, 45, 47, 50. Here a series of sizes approximating the English ones is adopted, but it is a series which must be memorized entire, as its advance is not by two or by three either, in regular sequence. We cannot question the wisdom of the men who have selected these shop sizes to meet their own wants; they rank too high as workmen, they know too much to challenge criticism. Doubtless, this scale of sizes is about the best they can do with the metric system; we would not tie ourselves to it. I could continue the list of practical difficulties until I had filled a volume. They run through the entire list of all that goes to make up the requirements of our profession, and show how unwise we would be to change, if we could do so, for the sake of harmony with Europe. We have not adopted the Whitworth system of screws in America, and yet, by so doing, we would place ourselves in harmony with all Europe. We recognize objections to the system, and when those objections were clearly pointed out by Mr. William Sellers and he proposed a system free from the objections, his system was accepted by the committee of the Franklin Institute and then by many departments of our government. Had the metric system shown itself to be the perfect system it is claimed to be, it too would have been taken up more generally at a time when it was easier to have done so than now.

There is an irreconcilable discord between the inch and the divisions of the meter. The inch has become fixed to a greater extent in dollars and cents, in fitness and convenience, in this country than in Germany, and yet there, in some cases I have shown, it cannot be given up. To keep our scale of sizes and use French dimension sizes would "furnish a precious example of the simplicity of the decimal system." I was a signer of the majority report of the Franklin Institute which opposed the compulsory adoption of the metric system. That report was prepared and written by the chairman, Mr. Wm. P. Tatham, since made president of the body which adopted it, as their view of the matter. Mr. Tatham is a man of culture and a hard student. His business as maker of lead pipes would have been less affected than that of almost any other manufacturer by the introduction of the metric system. He said, and I subscribed to the statement, that he believed that the ultimate benefits of the change proposed would be of less value than the damages during the transition. This was on the suppositious view that ultimately some would be benefited. As an engineer I can see no possible good to come to American machinists from the change. Its introduction exclusively would not diminish his labor in any way; it would not cheapen his product, it would increase its cost. It is in fact, however, so impossible, in view of existing matters, and existing harmony in interchangeable matter, that should the metric standard be made the only legal standard in America to be used in buying or selling, the engineering establishments now in existence could not heed the law, but must perforce use their existing tools and gauges of precision, and continue to make material in conformity with existing matter.

The metric system was admitted here to an equal fostering in point of law in 1866. It had not been legalized in any way when we, for good reasons, introduced it into our own workshop in Philadelphia, and yet, at that time, we asked no one's permission to do what we pleased in the metrological management of our own business. We had a chance to try the system in making something which did not clash with existing merchant sizes; once having profected an organization in this department we became fixed in its continuance. Precisely the same reasons why we cannot change our general system into the metric hold against our giving up the metric system in the department where it is in use.

If the change to the metric system will aid commerce, let the merchants do as we have done—try it. Commerce depends, in a large measure, on the possible output of our workshops. The engineer controlling the workshop, and who, to be successful, must be a merchant too, knows too well how he stands to give up a practically useful system more convenient to him after having tried both, for the sake of any fancied conformity with other countries. He can give up no vantage ground. His success in his life-battle, in these days of active competition, depends upon wise economies to enable him to prosper. He has no more reason to cripple himself with an inconvenient system of metrology than he has to give up a tariff of protection on his production in order to make it easier for the world to compete with him.

The mechanical engineer can accept nothing as true until he has demonstrated the truth by experiment; at least, in anything capable of being put to the test of experiment. It is in the power of any intelligent man to test the metric system as others have done. He will, I think, find that the savants who originated the scheme before mechanical engineering as it now exists was known as a profession, made the mistake of beginning at the wrong end, the big end of the scale, the size of the world, and by the time they had cut it up or down to human wants it came out less fitted to human requirements than if they had recognized in the beginning the needs of the beings who were to use it.

Our metrological reformers urge us to adopt a new system in place of our present one, a system that harmonizes in no way with anything we now use. This new system is practically based on a certain measure over 39 inches long. This is cut up into 1000 parts, and 100 of these parts cubed gives their primary vessel of measurement. The contents of this vessel in distilled water under certain conditions is their pound weight. Had the English yard of 36 inches been so treated it would have been as good a system, but no better. It would have been as inapplicable comfortably to our profession as is the metric. The wonderful extension of the metric system to time and infinite space was given up as impracticable long ago, and we are now asked to bear the shock of a mighty change to use this *inconvenient* system, this unhandy system of ten, for the sake of uniformity with some other peoples of the world.

In conclusion, when we take into consideration the enormous interests involved in manufacturing in America; if it is, as we think, unwise to tamper with the metrology of our workshops, the question may well be raised as to the wisdom of enforcing the metric system in trade generally. The practical mind of Americans has already dispensed with much useless stuff, coming to us with our old metrology; is it not better to continue to amend what we have, to encourage the uniformity so desirable, rather than to attempt to make all things new, but in no respect practically better, at so frightful a cost?

After a brief discussion, which was ordered to be resumed, the society adjourned, to reassemble at 8 o'clock P. M.

Thursday Evening Session.

On reassembling, the president announced that the vacancy in the office of secretary had been filled by the council, and Mr. T. W. Rae, 239 Broadway, had been appointed for one year.

The annual address from the Chair, which had been postponed until evening, was then read. We regret that we can only give an abstract of it:

PRESIDENT THURSTON'S ADDRESS.

After acknowledging the honor conferred by the society upon himself by his selection as their first president, and expressing his appreciation of the compliment and his gratitude for such distinction, the speaker proceeded as follows:

This society has been founded by members of the profession of engineering, who felt that there has long existed a necessity for an organization composed of men directly or indirectly connected with the work of mechanical construction. There had previously existed no society in which the work of the mechanical—or, as one of our honored vice-presidents has proposed to call him, the dynamical—engineer could receive special consideration.

Hundreds of engineers are engaged throughout this country in the work of designing and constructing machinery who have felt the need of opportunities to meet socially to compare their own ideas with those of their professional brethren, and who have desired to place before others in the business their plans, their discoveries, or the results of their researches.

Several of these gentlemen finally determined to make the attempt to effect an organization which should be composed of mechanical engineers, of those who are interested in mechanical matters and of others engaged in kindred pursuits.

OBJECTS OF THE SOCIETY.

The objects to be attained by this society, if the wishes and expectations of its founders are carried out, are the promotion of "the arts and sciences connected with engineering and mechanical construction," by the establishment of regular meetings to be attended by members of the engineering profession, and by those whose interests and pursuits lead them to associate themselves with us, at which meetings professional papers are to be discussed, and such other means of mutual instruction and entertainment are to be adopted as may be deemed best fitted to secure these objects.

It is further proposed to publish and to circulate among the members of the society such papers as shall be considered of sufficient value to justify publication.

It is hoped that, ultimately, this society may become useful to its members by gleaning from among the great mass of technical literature, which is every day becoming more extensive and more cumbersome both at home and abroad, such papers, wherever published, as shall have real value to the mechanical engineer, and presenting them, either in full or by abstracts, to its own members, as has been done lately in a very satisfactory way by the British Institute of Civil Engineers.

The headquarters of the society should be to all its members an attractive resort socially, and occasional *conversaziones* will probably be found as useful, as they undoubtedly will be a pleasant, means of securing acquaintanceship and frequent intercourse among members.

The society will have much work to do as a union of citizens having important interests confided to them, and its province will lie no less in the field of social ecomony than in that which has reference only to the individual interests of its members.

Glancing back for a moment upon the past, and observing the progress in all branches of industry which has been the result of the efforts of our predecessors and of our professional colleagues, we cannot fail to be impressed with the magnitude of the interests which are entrusted to our charge, and with the importance of doing the work which we are in these stirring times called upon to do, in an honest, earnest spirit and with our utmost skill, and we shall be encouraged to press on hopefully and with unflagging courage.

Looking back upon our past history, we have seen the growth of our cotton manufactures, from the small beginnings of Samuel Slater, and his humble rivals, in a new England village, grow, until to-day many mills of 40,000 spindles each have been built, and the hum of their machinery and the clatter of their shuttles make music in the ears of 200,000 thrifty and happy working people. From absolute dependence upon Great Britain, we have grown to independence, and now, more than millions of spindles, and nearly a quarter of a million looms in our thousand mills supply Canada, South America, and even China annually with millions of dollars' worth of goods.

Our associates have made this country the most prosperous and happy in the world.

As an illustration of the method in which advancement occurs, and as an example of the kind of work which remains for us to do; let us glance, very briefly, at the history of that greatest of modern triumphs of mechanism, the steam engine.

Away back, twenty centuries and more, in the dim past, among the first faint gleams of historic civilization, we see the germ of the invention which has done so much to annihilate space, and give man illimitable power over all the forces and treasures of nature—a toy in the museum at Alexandria. A toy it remained many centuries, until, in the grand awakening of three centuries ago, its latent power was discovered, and Papin, and Worcester, and Liebnitz, and Huyghens each contributed a thought in the progress which they thus inaugurated. A hundred and fifty years ago, the "steam giant" was at work under the direction of the intelligent blacksmith and his comrade, the "tinker," doing much for the mining industry, but nothing elsewhere, and, hampered by ignorance, and ill-cared for by his masters, wasting a vast deal of now utilized power.

Then came forward a genius of the brightest intellect, a mechanic such as the world rarely produces—James Watt—and, adopting the truly philosophic method, the great master soon taught the mighty servant to do a thousand times more for the world, and to labor with wonderfully greater ease and economy. Watt first collected his facts. He dissected the model of the Newcomen and Calley engine, which had been placed in his hands for repair, ascertained the method of its operation, learned what were the advantages, and what the disadvantages, of that form of engine, discovered the cause and extent of its losses of power and efficiency, and once these were known, his grand intellect promptly devised remedies and improvements, and the steam engine of to-day is simply the steam engine of James Watt, in all its leading features and in all the principal details of design. Its steam-jacketed cylinder is Watt's; its parallel motion and its guides; its crank motion—although an invention usually ascribed to another—were invented by Watt, and the condensing apparatus, the expansion gear, the governor, and even that wonderful little instrument, the "indicator"—the engineer's stethoscope—all came down to us from the same source.

Watt learned the leading facts, and made the greatest modifications of plan, while it was reserved for our contemporaries to contribute the refinements of its design and of its manufacture, and to study the more deeply-hidden principles of its philosophy, and to determine more definite rules for its construction and management.

Those of you who have been familiar with the design and construction of steam engines during the past twenty or thirty years,† and those of you who have been for a generation past accustomed to handle this miracle of art, will remember, as I remember well, how we learned at a very early period in our experience, certain cardinal points of practice which were very strongly impressed upon us. We soon learned by experience that efficiency was gained only as we learned to handle higher steam with properly adjusted expansion, to work our engines up to higher piston speeds, to cushion heavily when we had large clearance, to reduce that clearance to a minimum, to adjust the size of our engine to its work, and to determine the point of cut-off, under proper conditions otherwise, by the governor.‡ We learned that the now well-known "American Automatic Cut-off Engine," with its high steam and moderately large expansion, as exemplified by the "Corliss Engine," which is now built all over the world, was the representative of best general practice.

But we were not satisfied. Twenty years ago we began to understand that we had yet to perfect the philosophy of the steam engine, and that it was still apparently far from perfect efficiency. We then discovered that while our best engines were consuming from 25 to 30 pounds of dry steam per horse-power per hour, the mechanical equivalent of the heat supplies to the steam in the boiler was sufficient to give about a horse-power per each 2 pounds of high-pressure steam per hour, and hence that we were utilizing but 1-10th or 1-15th of the heat we were paying for when we settled our coal bills.

Next, we found that, owing to the fact that we cannot practically expand down to a pressure lower than that due approximately to the temperature of surrounding bodies, we must therefore discharge heat unutilized, that the larger part of this waste is unavoidable, and that an engine, perfect mechanically and working within the maximum of usually practicable limits, must waste three-fourths, and can return useful effect from but one-fourth of the heat supplied, thus placing the practical limit under known conditions at about 8 or 10 pounds of steam per hour and per horse-power.

And here we stand to-day with the steam engine, mechanically almost perfect, yet with a theoretical economy of about 8 or 10 pounds of steam per horse-power per hour, while consuming actually, in the best examples, about 15, *i. e.*, with an efficiency of 60 or 70 per cent.

In hot-air engines we are not making much more rapid progress, and our field of promise seems to be still in the improvement of the steam engine.

We are slowly learning other facts. We know that the great obstacle in the way of attaining nearly theoretical efficiency, is the transfer of heat from the steam to the exhaust side by initial condensation and re-evaporation; we are discovering that high speed and steam jacketing tend to lose their efficiency at extremely high pressure with wide ranges of expansion, that it seems possible to reach a point in steam-jacketed cylinders at which lower speed may tend to secure efficient working of the steam; that with well-jacketed cylinders we may get good performance, as we to-day judge it, with slow pistons; that we have better work claimed to-day for single than for "compound" engines by 10 or 15 per cent., § the minimum yet reached under fair conditions for economy being stated to be by experiment as 1.54 is to 1.75, while, assuming the very best conditions for each, it seems certain that both types should give about equally good results.

Here is where we stand to-day, and it is from this point that we are to work forward. We need to collect more facts by means of carefully devised experiments like those of Hirn and Hallauer abroad, and of Emery and of the Navy Department at home; we need careful and systematic study of the results, and finally the determination of the laws of steam engine efficiency as affected by steam pressure and temperature, rates of expansion and compression, character of steam jackets, rate of piston speed, and every other circumstance influencing economy.

This, and such as this, is work for some of us, and such work is to be done in every one of the many branches of industry which are here represented. And this, too, is a kind of work in which all can take part, fully confident that the good work shall benefit all and shall injure no one member of the human race.

PAPERS AND DISCUSSION.

Mr. A. L. Holley was next called upon to read a paper on "An Adaptation of Bessemer Plant to the Basic Process." Mr. Holley was received with hearty applause. It was his first appearance in any scientific society since his return from England, where, as most of our readers, and all of Mr. Holley's friends, will remember, he was very sick. He looks much better than his friends expected, but is not yet fully restored to health. His paper appears, with illustrations, on the first page of this issue.

In the discussion on Mr. Holley's paper a very high appreciation of his improvement was expressed, and it was generally regarded as solving the problem of the adaptation of the basic process to American practice, without sacrifice of product. Mr. Holley was asked, among other things, to what the difference between the productiveness of European and American plant was due. He replied that he had often considered this subject, and had reached the conclusion that it was due to two things about equally—better plant and better management.

Mr. J. C. Hoadley, of Lawrence, Mass., followed Mr. Holley with some remarks on the "Causes of Efficiency in the Compound Engine." His remarks were illustrated by a series of drawings. We are unable at this time to give even an abstract of Mr. Hoadley's remarks, which were based upon a purely theoretical study of the compound engine, and which we shall have opportunity of considering and discussing more intelligently hereafter than would be possible if depending entirely on what we can recall of his paper from imperfect notes. The discussion of Mr. Hoadley's paper was postponed until the following morning.

The last paper of the evening session was a short, but important, one by Mr. Chas. T. Porter, on "Strength in Machine Tools." We shall give it in our next issue.

Friday Morning Session.

On reassembling at 10 A. M., the Chair announced that the discussion of Mr. Hoadley's remarks on the compound engine was the first order of business. From the interest with which it was sustained, it promised to last until the end of the session. Messrs. Leavitt, Woodbury, Robinson, Sweet, Porter, Church, Worthington, Carpenter, Holloway, Emery, Weber and others took part. It was followed by a brief discussion on Mr. Porter's paper, chiefly by Mr. Sellers and Mr. Emery.

Mr. C. J. H. Woodbury next read a paper on "Friction and Lubrication," in which were given the results of a series of experiments with oils adapted to the lubrication of spindles. Mr. Woodbury is evidently a careful and accurate experimenter, and as his tests are to be extended to large bearings and heavy pressures, they will undoubtedly give very valuable results. The great value of Mr. Woodbury's work is that he tests oil and lubricants under conditions as nearly as possible identical with those which obtain in actual use. He has tested spindle lubricants with spindles in a frame under conditions as nearly as possible the same as those which exist in mills. Mr. Woodbury was highly complimented on his paper, from which we hope to quote in future issues.

Prof. S. W. Robinson followed Mr. Woodbury with two papers on the "Efficiency of the Crank" and "Cushioning in Steam Engines."

At this point Mr. Henry R. Worthington asked leave to offer a resolution. For the first time he found himself in the presence of a body which he considered competent to speak for the mechanical engineers of the country. He looked upon the utterances of those who, pretending to speak for the mechanical professions, had favored the legalizing of the metric system, as a gratuitous impertinence, and he should much like to hear an expression of the views of the meeting on this subject. His resolution as placed before the meeting was as follows:

Resolved, That this society deprecates any legislation tending to make the adoption of the metric system of measures obligatory in our industrial establishments; also,

Resolved, That the secretary be instructed to communicate the sentiments of this resolution to all concerned in procuring such legislation, and also to send a copy to the Anti-Metric Society of Cleveland.

It was evident that the sympathy of the audience was strongly in favor of this resolution, and that a majority of those present were eager to give expression to their opposition to the metric system. There were differences of opinion, however, as to the best way of doing this, and it was finally decided that, as the resolution committed the society to an expression of views, it should be voted upon by a letter ballot. This was ordered, and the result of the ballot will probably be announced at the next meeting.

Mr. Reese read a paper on a new form of regenerative furnaces for metallurgical purposes, of which we shall speak in a subsequent issue.

Mr. Stetson read a short but valuable paper on standard screw threads, which gave rise to an interesting discussion, in which several gentlemen took part.

Prof. Sweet remarked that he thought when makers filled orders for taps from parties to whom the kind used made little difference, they would be doing a good work if they would only send the flat-topped style. They would thus be spreading the use of the United States Standard. He said he had been much surprised recently when he ordered a set of taps, without specifying the United States Standard, to receive a common V-thread, and was obliged to send them back and order more particularly. It showed how great a proportion of the orders must be sent to the makers with no particular style indicated.

Mr. Stetson, in reply, said that he was afraid if his firm filled their orders with the flat-topped threads that they would soon have indignant letters, asking if they did not know better than to send "them things" for taps.

Mr. Forney, of the *Railroad Gazette*, spoke of the difficulty of accurately determining the standard thread. The consequence of this was that what were assumed to be the standards vary among themselves. The Master Car Builders' and Master Mechanics' Associations have both adopted the United States or Franklin Institute standard for all car and locomotive work. All railroad work, therefore, is nominally standard in the matter of bolts and nuts. But the difficulties of measurements, and the doubt as to what is the correct standard, still lead to trouble. As an illustration, a railroad, not long since, ordering some thousand cars, specified that the bolts and nuts were to be of the Franklin Institute Standard. When the cars were delivered it was found that the nuts and bolts were not interchangeable with those already in use, except the larger nuts on the smaller bolts. Investigation showed that the works which built the cars had purchased new taps and dies, said to be standard, for that especial work, but upon comparison it was found that these did not agree with certain other standards. An easy and accurate system of measurement, applicable to screw threads, was greatly needed, else we were likely to have some confusion, even when the screws were nominally all standard.

Mr. Rose said that he thought the differences which were to be found in threads could be accounted for more by the shrinking and changing of the tools from hardening than from wear; not only the form of the thread, but the angle of the pitch could easily be changed by the manner of hardening.

Prof. Egleston made an inquiry in regard to some patented method, the specification of which he had hurriedly examined, by which the errors of the leading screw of a lathe could be corrected. He had seen the patent, but was unable to give any particulars. Several gentlemen spoke of methods of making corrections, one of which involved certain calculations in regard to recorded errors of the screw. Prof. Egleston said that the patent referred to was quite simple. No one, however, was able to give the desired information.

Mr. Sellers said that in his own establishment they had found it cheapest to buy their taps and dies and not attempt the manufacture. He said that the original screws of the leading lathe makers of the country were much more nearly accurate than might be supposed, and were capable of doing very fair work. It was to be recommended that in shops where there were a number of lathes which were of about the proper size for tool making, leading screws for each should be cut, so as to give each one a screw that could do good work or relieve the tool lathe from the labor of doing everything of the kind to which its size adapted it. Mr. Sellers also made some remarks on the wastefulness of having iron over size, that the rolling mills were ready to furnish iron rolled to any desired size, and that there was less difficulty in obtaining the proper sizes than some persons supposed. They had only to ask for what they wanted in order to obtain it.

Mr. Porter's remarks were somewhat extended and very interesting. He spoke of the unaccountable features of the Whitworth system, and said that in his connection with that establishment some years ago he had an opportunity to learn something of the reason which caused the adoption of the very peculiar pitch and form of thread which had been selected. The angle of the thread, for example, which was 55 degrees, could not be originated, nor bisected, nor measured by any ordinary methods. It could not, in fact, be obtained except by long and difficult methods. It was adopted for this very reason, in order that the manufacturer of tools might remain entirely in the hands of the establishment. The angle when once lost could not be restored, or not without the greatest difficulty. It had, in fact, happened on one occasion that the angle was lost in Whitworth's own shop, and the fact was not known until attention was called to it by a customer. It was about a year before the angle was recovered and the work of the establishment put upon the original footing. In regard to the number of threads to the inch, the Franklin Institute Standard was superior to Whitworth's. This was especially the case with the half-inch bolt, the 12 threads of the Whitworth system unnecessarily weakening the bolt. This fact was admitted by men in Whitworth's own shop with whom the speaker had conversed upon the subject. In regard to standards for shop measurements it was hardly possible to take too much care. The shop standards should never be used for any work other than testing the gauges used in the shop. These in turn should be tested by a set of standards which never went into the shop, and only used for correction. Lastly, the originals, which should be most carefully guarded and only used for testing at intervals the last named standards. In this way only is it possible to keep the shop gauges accurate and the work up to the standards.

Other speakers took up the subject, and the importance of a single standard, the value of an easy, accurate method of measuring bolts, nuts, the thread angles and sizes and several other points were discussed briefly. The session closed by a paper from Mr. Allan Sterling upon "Economy in Steam Engines," the discussion being postponed until the evening session.

Friday Evening Session.

The evening session began with a discussion of Mr. Sterling's paper. It was opened by Mr. Hemenway, who said that we should

† Report on Machinery and Manufactures at Vienna, 1873, by R. H. Thurston, &c., Wash., 1875.

‡ History of the Growth of the Steam Engine; International Series; N. Y. 1878, p. 473.

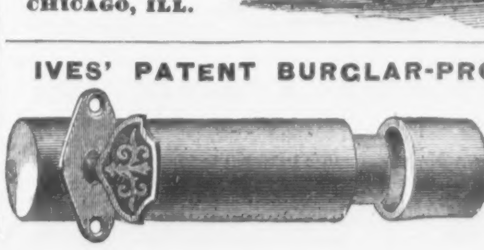
§ Abstracts of Papers, No. 1602; Proc. Brit. Inst. C. E. Vols. LIII, LIV. It would seem that where slow piston-speed is demanded, as usually with pumping engines, or where two cylinders are needed, as with marine engines, the "compound" engine is unmistakably best; while, where high-speed engines are permitted, as in mills, the single cylinder may still hold its own in this competition.

The Iron Age Directory

and Index to Advertisements.

PAGE

Agricultural Implements.
Grant Fan Mill and Cradle Co., Melrose, N. Y......25
Air Compressors.
Clayton Steam Pump Works, 14 and 16 Water st., Brooklyn, N. Y......38
The Norwalk Iron Works Co., S. Norwalk, Conn..35
Alarm Money Drawers.
Tucker & Dorsey, Indianapolis, Ind......10
Anti-Friction Metals.
Reeves Paul S., Philadelphia......38
Anvils. *Manufacturers of.*
Fisher & Norris, Trenton, N. J......
Architectural Iron Work.
Ætna Iron Co., 86 Goerck, N. Y...... 6
Chamberlin E. K. & Co., Cleveland, O...... 6
Asbestos Materials.
The Chalmers-Spence Co., Foot 9th st., E. R., N. Y..34
Axle Grease.
Meriam & Morgan Paraffine Co., Cleveland, O......30
Axles, Springs, &c., *Manufacturers of.*
Cook R. & Sons, Winsted, Conn...... 8
Hotchkiss Guy C., Field & Co., 622 E. 14th, N. Y......33
Lambertville Iron Works, Lambertville, N. J...... 7
Wurster F. W., Brooklyn, N. Y......38
Babbit Metal.
Philada. Smelting Co., 12th and Noble, Phila......31
Bag Holder.
Sprengle L. Jeff., Ashland, Ohio......
Barb Wire.
Thorn Wire Hedge Co., Chicago, Ill...... 6
Bed Screws.
Shelton & Co., Birmingham, Ct......
Bellows, *Manufacturers of.*
Scott Geo. M., Chicago, Ill......23
Bells (Sleigh.)
Bevin Bros. Mfg. Co., Easthampton, Conn......25
Belt Hooks.
Browning, Sisum & Co., 85 Chambers, N. Y......25
Belting, *Makers of.*
Alexander Bros., 412 N. 3d, Philadelphia......33
Forepaugh Wm. F., Jr., & Bros., Philadelphia......33
N. Y. Belting and Packing Co., 37 Park Row, N. Y..13
Peck & Bemis, Cleveland, O......11
Bicycles.
Pope Mfg. Co., 65 Summer, Boston......38
Bird Cages, *Makers of.*
Gunther G., 105 William St., N. Y...... 7
Lindeman O. & Co., 254 Pearl, N. Y...... 3
Maxheimer John, 247 and 249 Pearl, N. Y...... 7
Bit Braces, *Manufacturers of.*
Millers Falls Co., 74 Chambers, N. Y......21
Saxton & Amidon, Buffalo, N. Y......38
Blocks, Tackle, *Makers of.*
McMillan Wm. H. & Bro., 113 South, N. Y......38
Penfield Block Works, Lockport, N. Y......28
Providence Tool Co., Providence, R. I......21
Boiler Coverings.
The Chalmers-Spence Co., foot 9th St., E. R., N. Y..34
Bolt Cutters.
Cleveland Machinery Depot, Cleveland, O......35
Sellers Wm. & Co., Phila. and 79 Liberty st., N. Y..37
Wiley & Russell, Greenfield, Mass......34
Bolts.
American Bolt Co., Lowell, Mass......11
Coleman Eagle Bolt Works, Philadelphia......32
Newcomb, Olsen & Co., Indianapolis, Ind......33
Bracket Woods.
Uptegrove W. E., foot East 10th St., N. Y......28
Brass, *Manufacturers of.*
Ansonia Brass and Copper Co., 19 Cliff, N. Y...... 2
Bridgeport Brass Co., Bridgeport, Conn...... 2
Brown & Bros., 81 Chambers, N. Y...... 3
Davol John & Sons, 100 John, N. Y...... 2
Holmes, Booth & Haydens, 49 Chambers, N. Y..2&11
Manhattan Brass Co., 1st ave. & 27th st., N. Y...... 2
Merchant & Co., 507 Market st., Phila......27
Plume & Atwood Mfg. Co., 80 Chambers, N. Y...... 2
Rome Iron Works, Rome, N. Y...... 3
Scovill Mfg. Co., 421 Broome, N. Y...... 2
Waterbury Brass Co., 296 Broadway, N. Y...... 2
Brass Founders.
Reeves Paul S., Philadelphia......38
Brass Wire Cloth.
Howard & Morse, 45 Fulton, N. Y...... 2
Bridge Builders.
Moseley Iron Bridge and Roof Co., 5 Dey, N. Y...... 6
Broilers.
Dick Broiler Co., Buffalo, N. Y......24
Butcher and Shoe Knives. *Manufacturers of.*
Wilson John, Sheffield, England......10
Butts and Hinges.
American Spiral Spring Butt Co., 82 Beekman, N. Y.38
New England Butt Co., 30 Platt, N. Y......27
Sabin Mfg. Co., Montpelier, Vt......29
Stanley Works, New Britain, Conn...... 8
Union Mfg. Co., 96 Chambers, N. Y......12
Calipers and Dividers.
Stevens J. & Co., Chicopee Falls, Mass......10
Carriage Bolts. *Makers of.*
Shelton & Co., Birmingham, Ct......
Townsend, Wilson & Hubbard, Philadelphia......35
Carriage Hardware. *Makers of.*
Cowles C. & Co., New Haven, Conn...... 8
Smith H. D. & Co., Plantsville, Conn......12
The E. D. Clapp Mfg. Co., Auburn, N. Y...... 8
Carriage Springs.
Dexter Spring Co., Hulton Pa......
Car Axles.
Roberts A. & P. & Co., 265 S. 4th, Philadelphia...... 5
Casters.
Phœnix Caster Co., Indianapolis, Ind......10
Castings, Iron.
Cheney S. & Son, Manlius, N. Y......25
Elwell Hardware Co., Bridgeport, Conn......38
St. Louis Malleable Iron Co., St. Louis, Mo...... 4
Caulking Irons.
Carver John, 44 North 3d St., Brooklyn, E. D., N. Y.20
Chains, *Manufacturers of*
Bradlee & Co., 816 Richmond St., Phila., Pa...... 5
Round David, Cleveland, Ohio......32
Chains, Sash.
Morton Thomas, 65 Elizabeth, N. Y......32
Chisels, *Manufacturers of.*
Buck Bros., Millbury, Mass......21
Chucks.
Sweetland & Co., New Haven, Conn......24
Union Mfg. Co., 96 Chambers, N. Y......12
Clippers Horse
Clark W., London, England......29
Clock Springs, &c.
Cary & Moen, 234 W. 29th, N. Y...... 3
Dunbar Bros., Bristol, Conn......32
Coal, *Miners of.*
Ely E. B. & S. W., New York......29
Pardee A. & Co., 111 Broadway, N. Y......29
Coal Hods.
Griffiths Geo., Phila. Pa......
Esterbrook Wm., Philadelphia......24
Coffee and Spice Mills.
Lane Brothers, Millbrook, N. Y......33
Enterprise Mfg. Co., Philadelphia, Pa......27
Coke.
Wister Francis, 230 S. Third, Phila...... 5
Compasses and Dividers, *Manufacturers of.*
Bemis & Call Hdw. & Tool Co., Springfield, Mass..18&25
Copper.
Merchant & Co., 507 Market st., Phila......27
Pope, Cole & Co., Baltimore, Md...... 3
The New Haven Copper Co., 255 Pearl, N. Y...... 2
Corn Huskers.
Chambers, Bering & Quinlan, Decatur, Ill......28
Corn Sheller.
Goddard Curtis, Alliance, O......25
Corrugated Iron.
Moseley Iron Bridge and Roof Co., 5 Dey, N. Y...... 6
Cotters and Cotter Keys.
Browning, Sisum & Co., 85 Chambers, N. Y......25
Countersink.
Barber D. F., 1321 Washington, Boston......36
Cupolas.
Smith & Sayre Mfg. Co., 21 Cortlandt, N. Y......36
Cutlery, *Importers of.*
Boker Hermann & Co., 101 Duane, N. Y......28
Clatworthy F. & W., 82 Chambers, N. Y......10
Friedmann & Lauterjung, 91 Chambers, N. Y......10
Cutlery, *Manufacturers of.*
Burkinshaw Aaron, Pepperell, Mass......10
Conway T. C., 90 Chambers, N. Y......
Greenfield Tool Co., Greenfield, Mass......24
Goodell Co., Antrim, N. H......
John Russell Cutlery Co., 90 Chambers, N. Y......38
Meriden Cutlery Co., 49 Chambers, N. Y......10
The Wm. Rogers Mfg. Co., Hartford, Ct......11
The Lamson & Goodnow Mfg. Co., 88 Chambers, N. Y......10
Differential Pulley Blocks.
Yale Lock Mfg. Co., 53 Chambers, N. Y...... 3
Dinner Pail and Lanterns.
Haight Jos., Portchester, N. Y......38
Discount Tables.
Jennings S. H., Deep River, Conn......
Door and Gate Springs.
Van Wagoner & Williams, 82 Beekman, N. Y......38
Door Bolts.
Ives Hobart B., New Haven, Ct......23
Drilling Machines, *Makers of.*
Boynton & Plummer, Worcester, Mass......37
Folger A. E. & Co., Springfield, O......34
Sellers Wm. & Co., Phila. and 79 Liberty st., N. Y.37
Thorne, De Haven & Co., Philadelphia......36
Wiley & Russell Mfg. Co., Greenfield, Mass......34
Drop Forgings.
Merrill C. & Sons, 556 Grand, N. Y......38
Drop Hammers.
The Stiles & Parker Press Co., Middletown, Ct......38
Drop Presses, *Makers of.*
Beecher & Peck, New Haven, Ct......25
Edge Tools, *Makers of.*
Doscher M., 66 Chambers, N. Y......10
Elevators, *Makers of.*
Crane Bros. Mfg. Co., Chicago, Ill......36
Stokes & Parrish, Philadelphia......36
Elevator Buckets.
Rowland T. F., Brooklyn, N. Y...... 9
Emery and Emery Wheels.
Ashland Emery Co., Perth Amboy, N. J......
Irvine A. A. & Co., 14 Murray, N. Y......30
Lehigh Valley Emery Wheel Co., Weissport, Pa....38
Vitrified Wheel Co., Westfield, Mass......30
Engines, Gas.
Schleicher, Schumm & Co., Philadelphia......36
Engines (Locomotive).
Baldwin Locomotive Works, Philadelphia, Pa...... 6
Engines, Steam, *Makers of.*
Davis A. J. & Co., Newark, N. J......34
Southwark Foundry and Machine Co., Phila., Pa..37
The Norwalk Iron Works Co., S. Norwalk, Conn..35
Wetherill Robt. & Co., Chester, Pa......37
Faucets, Brass, *Makers of.*
McNab & Harlin Mfg. Co., 30 Gold, N. Y......35
Faucets, *Self-Measuring, Makers of.*
Enterprise Mfg. Co., of Pa., Phila. and N. Y......27
Lane Bros., Millbrook, N. Y......33
Fencing, &c.
Cleveland Wrought Iron Fence Wks., Cleveland, O. 7
Files, *Importers of.*
Carr J. & Riley 30 Gold, N. Y......30
Files, *Manufacturers of.*
Auburn File Works, 89 Chambers, N. Y...... 8
Barnett G. & H., 41 and 43 Richmond, Phila...... 8
Clark & Draper, Sing Sing, N. Y...... 8
Disston Henry & Sons, Phila......32
Everhart James M., Scranton, Pa......38
Heller & Bros., Newark, N. J...... 8
Hiscox File Mfg. Co., West Chelmsford, Mass...... 8
Johnson & Bro., 1 Commercial, Newark, N. J...... 8
McCaffrey & Bro., 1732 and 1734 N. 4th, Phila...... 8
Nicholson File Co., Providence, R. I...... 8
Paul Chas. B., Williamsburgh, N. Y...... 8
Spencer J. R. & Son, Sheffield, England......10
Union File Works, Baltimore, Md...... 8
Filters.
Crocker Filter Co., Boston, Mass......20
Jewett John C. & Sons, Buffalo, N. Y......27
Fire Arms.
Conway T. C., 90 Chambers, N. Y......
Hartley & Graham, 17 Maiden Lane, N. Y......12
Lovell John P. & Sons, Boston, Mass......38
Fire Brick, *Makers of.*
Borgner & O'Brien, Philadelphia, Pa......32
Brooklyn Clay Retort and Fire Brick Works, Van Dyke St., Brooklyn, N. Y......32
Gardner Brothers, Pittsburgh, Pa......32
Hall & Sons, Buffalo, N. Y......32
Justice Philip S., Philadelphia......32
Kreischer B. & Sons, foot of E. Houston St.,......32
Maurer Henry, 418 East 23d, N. Y......32
Newton & Co., Albany, N. Y......32
Ostrander James & Son, Troy, N. Y......32
Perth Amboy Terra Cotta Co., Perth Amboy, N. J..32
Valentine M. D. & Bro., Woodbridge, N. J......32
Watson John R., Perth Amboy, N. J......32
Flint and Emery Paper and Cloth.
Baeder, Adamson & Co., 730 Market, Phila......
Forges, Portable, &c.
Buffalo Forge Co., Buffalo, N. Y......38
Cooke William, 6 Cortlandt, N. Y......37
Empire Portable Forge Co., Cohoes, N. Y......
Holt Mfg. Co., Cleveland, O......35
Keystone Portable Forge Co., 278 Carter, Phil......37
Forgings, Iron and Steel.
Rose Wm., & Bros., West Philadelphia, Pa...... 6
Foundry Facings.
Obermayer S. & Co., Cincinnati, O......33
Paxson J. W. & Co., 514 Beech, Phila...... 5
Whitehead Bros., 517 W. 15th, N. Y...... 3
Fry Pans.
N. Y. Stamping Co., 311 Avenue A, N. Y......27
Furnaces, *Makers of.*
Richmond & Potts, 119 S. 4th, Phila., Pa...... 5
Furnace Hoists.
Stokes & Parrish, Philada., Pa......36
Furnace Shields.
McDonald H., Pittsburgh, Pa......36
Furniture Springs.
Cary & Moen, 234 W. 29th, N. Y...... 3
Galvanized Iron.
Hoopes & Merry, 547 W. 15th st., N. Y...... 6
Lefferts Marshall, 90 Beekman, N. Y...... 4
Garden Tools.
Dunlap C. W. & Co., 43 Chambers, N. Y......
Glass.
Fox & Co., Durhamville, N. Y......33
Governors.
Judson Junius & Son, Rochester, N. Y......37
Grate Bars.
Creswell David S., Philadelphia, Pa......34
Grindstones.
Lombard & Co., Boston, Mass......
Wood H. S. & Co., 33 West, N. Y......30
Wood Walter R., 283 and 285 Front, N. Y......30
Gunpowder, *Makers of.*
Kittredge B., N. Y......28
Kneeland F. L. (Dupont) 70 Wall, N. Y......28
Laflin & Rand Powder Co. 29 Murray, N. Y......28
Handles, Spokes &c.
Hundley & Hanks, 79 Reade, N. Y......31
Hangers, Barn Door.
Kidder Slide Door Hanger Co., Romeo, Mich......
S. H. & E. Y. Moore, Chicago, Ill......27
Hardware Commission Merchants.
Fernald & Sise, 100 Chambers, N. Y......
Graham & Haines, 113 Chambers, N. Y...... 8
Heaton & Denckla, 507 Commerce, Phila......21
Hymes David & Co., 92 Church, N. Y......21
Hardware Dealers.
Lloyd, Supplee & Walton, 625 Market, Phila......21
Shepard Sidney & Co., Buffalo N. Y......
Hardware Importers.
Boker Hermann & Co., 101 Duane, N. Y......28
McCoy & Co., 134 and 136 Duane, N. Y......10
Hardware Manufacturers.
Coulter, Flagler & Co., 87 Chambers, N. Y...... 9
Cowles Hardware Co., Unionville, Conn......33
Enterprise Mfg. Co., Phila......27
Globe Mfg. Co., Middletown, Conn...... 7
Lloyd, Supplee & Walton, 625 Market St., Phila., Pa.21
Miller's Falls Co., 74 Chambers, N. Y......21
Perin & Gaff Mfg. Co., Cincinnati, O......31
Shannon J. B. & Sons, Philadelphia, Pa......24
Shepard Hardware Co., Buffalo, N. Y......
Stanley Works, New Britain, Conn...... 8
Tiebout W. & J., 33 Chambers, N. Y......32
Trenton Lock & Hardware Co., Trenton, N. J......29
Union Mfg. Co., 99 Chambers, N. Y......12
Van Wagoner & Williams, 82 Beekman, N. Y......38
Hardware Specialties.
Cleveland Wrought Iron Fence Works, Cleveland, O 7
Comly James, Philadelphia, Pa...... 9
Davis Wm. L., Chelsea, Mass......24
Glemser F. & Co., Cincinnati, Ohio......24
Philadelphia Novelty Mfg. Co., Philadelphia, Pa. .24
Security Blind Fast Co., Providence, R. I......10
Shepard Sidney & Co., Buffalo, N. Y......
Spencer & Underhill, 94 Chambers, N. Y......13
Sprague Novelty Works, Rochester, N. Y......25
Harness Snaps.
Covert Mfg. Co. West Troy, N. Y......
Harrows.
Kimberlin R. P. & Co., Indianapolis, Ind......29
Hay Knives.
Holt Hiram & Co., East Wilton, Me......
Hektograph.
Hektograph Co., 22 Church N. Y......31
Hinges.
Cowles Hdw. Co., Unionville, Ct......33
Scovill Mfg. Co., 419 Broome, N. Y...... 2
Stanley Works, New Britain Conn...... 8
Hog Ringers.
Chambers, Bering & Quinlan, Decatur, Ill......28
Hoisting Engines, *Makers of.*
Crane Bros., Mfg. Co., Chicago, Ill......36
The Norwalk Iron Works Co., S. Norwalk, Conn..35
Hoisting Machines.
Box Alfred & Co., 312 Green, Phila......37
Cincinnati Chain Hoist Co., Cincinnati, O......36
Harrington Edwin & Son, Philadelphia, Pa......37
Sellers Wm. & Co., Phila. and 79 Liberty st., N. Y..37
Stokes & Parrish, Philada., Pa......36
Hooks (Cotton & Bale.)
New York Handle & Mallet Works, 456 E. Houston..13
Horse Clippers.
Boker Hermann & Co., 101 & 103 Duane, N. Y......28
Shannon J. J., Philadelphia, Pa...... 8
Horse Nails, *Makers of.*
Ausable Horse Nail Co., 4 Warren, N. Y......25
Bridgewater Iron Co., Bridgewater, Mass......25
FP Nail Co., Cleveland, O......28
National Horse Nail Co., Vergennes, Vt......21
Saranac Horse Nail Co., Plattsburg, N. Y......12
Horse Shoes, *Makers of.*
Bradlee & Co., Philadelphia, Pa...... 5
Burden Iron Works, Troy, N. Y...... 4
Bussing A., 4 Warren, N. Y......21
Rhode Island Horse Shoe Co., Providence, R. I...... 9
Schoenberger & Co., Pittsburgh, Pa...... 4
Hot Blast Stoves.
Witherow & Gordon, Pittsburgh, Pa......34
Housefurnishing Goods.
Enterprise Mfg. Co., Geneva, O......
Hydrants, &c.
McLean John, 300 Monroe, N. Y......28
Mohawk & Hudson Mfg. Co., Waterford, N. Y......24
Hydraulic Jacks.
Dudgeon Richard, 24 Columbia, N. Y...... 9
Ice Cream Freezers.
White Mountain Freezer Co., Laconia, N. H...... 8
Insurance, Boiler.
Hartford Steam Boiler Inspection & Insurance Co..37
Iron. *(Manufacturers' Agents.)*
Cox, Jr., Justice & Co., 333 Walnut, Phila...... 5
Hoffman J. W. & Co., 208 S. 4th, Phila...... 5
Levis Henry & Co., Philadelphia, Pa...... 5
Lundell Chas. G. (Swedish), Boston, Mass...... 4
Iron. *Manufacturers of.*
Albany & Rensselaer Iron & Steel Co., Troy, N. Y..30
Allentown Rolling Mill Co., Allentown, Pa...... 5
Britton Iron and Steel Co., Cleveland, Ohio...... 6
Burden Iron Works, Troy, N. Y...... 4
Coleman Rolling Mill Co., Louisville, Ky......31
Kirkpatrick & Co., Pittsburgh Pa...... 4
Kloman Andrew, Pittsburgh, Pa...... 4
Lang W. Bailey, 50 Beekman, N. Y...... 4
Logan Iron & Steel Co., Philadelphia, Pa...... 5
North Chicago Rolling Mill Co., Chicago, Ill......27
Phœnix Iron Co., 410 Walnut, Philadelphia...... 4
Portsmouth Iron and Steel Co., Portsmouth Ohio. 6
Roane Iron Co., Chattanooga, Tenn...... 6
Rome Merchant Iron Mills, Rome, N. Y...... 5
Rowland James & Co., 920 N. Delaware ave., Phila. 5
Rowland Wm. & Harvey Philadelphia......38
Shoenberger & Co., Pittsburgh, Pa...... 6
Taylor & Boggis, Cleveland, O...... 4
The Passaic Rolling Mill Co., Paterson, N J...... 4
Ulster Iron Works, 18 Wall, N. Y...... 4
Williams, Long & McDowell, Pittsburgh, Pa...... 4
Wood Alan & Co., 519 Arch, Philadelphia...... 5
Zug & Co. Pittsburgh, Pa...... 4
Iron Brokers.
Boynton Geo. A., 70 Wall, N. Y...... 6
Etting Edward J., Philadelphia, Pa...... 5
Gallaudet P. W., 3 & 5 Wall, N. Y...... 4
Hatry A. G., Pittsburgh, Pa...... 4
Iron, Charcoal. *Warm or Cold Blast.*
Logan Iron & Steel Co., Philadelphia...... 5
Lundell, Chas. G. (Swedish), Boston, Mass...... 4
Quincy John W., 98 William, N. Y...... 4
Iron Commission Merchants.
Bailey J. F. & Co., 52 Wall, N. Y...... 5
Heberton & Co., Philadelphia...... 5
Lundell, Chas. G., Boston, Mass...... 4
Mohr J. J., 430 Walnut, Philadelphia...... 5
Richardson J. O., 232 Dock, Philadelphia...... 5
Wister L. & R., 323 Walnut, Phila...... 5
Iron Dealers.
Abeel Brothers, 190 South N. Y...... 4
Adams Hugh W., 56 Pine, N. Y...... 4
Bonnell, Botsford & Co., Youngstown, O...... 6
Borden & Lovell, 70 and 71 West, N Y...... 4
Carmichael & Emmens, 130 and 132 Cedar, N. Y...... 4
Cooney Daniel F., 88 Washington, N. Y...... 4
Egleston Bros & Co., 160 South, N. Y...... 4
Harrison & Gilloon, 548 to 562 Water, N. Y...... 4
Hoffman J. W. & Co., 208 S. Fourth, Philadelphia.. 5
Judson B. F., 457 and 459 Water, N. Y...... 4
Kane C., Pittsburgh, Pa...... 4
Lissberger S. A., 529 E. 19th, N. Y...... 4
Lundberg Gustaf, 38 Kilby, Boston, Mass...... 4
Lundell Chas. G. (Swedish), Boston, Mass...... 4
Middleton W. S., 52 John, N. Y...... 4
Naylor & Co., 99 John, N. Y......30
Ogden & Wallace, 85, 87, 89 and 91 Elm, N. Y...... 4
Pierson & Co., 24 Broadway, N. Y...... 4
Pitts Fred. & Co., London, England......16
Pullman J. Wesley, Philadelphia, Pa...... 5
Quincy John W., 98 William, N. Y...... 4
Richards D. W. & Co., 92 Mangin, N. Y...... 4
Swan John E. & Bros., Glasgow & Middlesbrough. 6
Wallace Wm. H. & Co., Albany and Washington streets, N. Y...... 4
Warner A. B. & Son, 28 and 29 West, N. Y...... 4
Williamson James & Co., 69 Wall, N. Y...... 4
Wilson, R. A. & Co., Pittsburgh Pa...... 4
Whitney A. R., 58 Hudson, N. Y...... 4
Iron, Pig, *Importers of.*
Clark E. W. & Co., Philadelphia, Pa...... 5
Lee James & Co., 72 Pine, N. R...... 4
Lundell, Chas. G. (Swedish), Boston, Mass...... 4
Wheeler E. S. & Co., 54 Cliff, N. Y...... 6
Williamson James & Co., 69 Wall, N. Y...... 4
Iron, Sheet, *Manufacturers of.*
Wood W. D. & Co. Pittsburgh, Pa...... 4
Iron Stable Fixtures.
Howard & Morse, 45 Fulton, N. Y...... 2
Lanterns, *Manufacturers of.*
Dietz R. E., 54 and 56 Fulton, N. Y......38
Howard & Morse, 45 Fulton, N. Y...... 2
Miller Edw'd & Co., 35 Warren, N. Y......25
Lathe Dogs.
Coles H. H. & Co., Philadelphia, Pa......37
Levels.
Disston Henry & Sons., Philadelphia......32
Jennings C. E., 96 Chambers, N. Y......37
Locks and Knobs.—*Manufacturers of.*
Bohannan Wilson, Broadway and Kossuth, Brooklyn, E. D...... 6
Branford Lock Works, Branford, Conn......29
Coulter, Flagler & Co., 87 Chambers, N. Y...... 9
D. K. Miller Lock Co., Philadelphia, Pa......
Durrie & McCarty, 97 Chambers, N. Y......21
Hillebrand & Wolf, 110 S. 8th, Philadelphia......25
Romer & Co., Newark, N. J......35
Smith & Egge Mfg. Co., Bridgeport, Conn......25
Yale Lock Mfg. Co., 53 Chambers, N. Y...... 3
Lubricator.
American Lubricator Co., Detroit, Mich......35
Machinery, *Makers of.*
Akron Iron Co., Akron, O......29
Bliss & Williams, 167 Plymouth, Brooklyn......36
Box Alfred & Co., 312 Green, Phila......37
Bradley & Co., Syracuse, N. Y......21
Cooke Wm., 6 Cortland, N. Y......37
Forsaith S. C. & Co., Manchester, N. H......36
Garvin E. E. & Co., 139 Center, N. Y......37
Johnson, Israel H. Jr., Philadelphia, Pa......34
Landis Ezra F., Lancaster, Pa......34
L. B. Flanders Machine Works, Philadelphia, Pa..34
Lyon E. & Co., 470 Grand, N. Y......36
Mohawk & Hudson Mfg. Co., Waterford, N. Y......24
Oram & Atherton, Cleveland, O......36
Pittsburgh Mfg. Co., Pittsburgh, Pa......36
Sellers Wm. & Co., Phila. and 79 Liberty st., N. Y..37
Stokes & Parrish, Philada., Pa......36
The Stiles & Parker Press Co., Middletown, Ct......28
Wetherill Robert & Co., Chester, Pa......37
Machinery (Barnes's Foot Power.)
Little Chas. E., 60 Fulton, N. Y......10
Machine Screws, *Makers of.*
Fellows John, Williamsburg, N. Y......36
Waterbury Mfg. Co., Waterbury, Conn...... 2
Machinists' Tools.
Blaisdell P. & Co., Worcester, Mass......35
Brooks A. G. & Winebrener, Philadelphia, Pa......16
Bullard E. P., 14 Dey, N. Y......16
Cooke Wm., 6 Cortland N. Y......37
Geo. Place Machinery Agency, 121 Chambers, N.Y.
Harrington E. & Son, 15th st. and Pennsylvania ave., Philadelphia Pa......37
J. Gray Machinery Depot, 37 Dey, N. Y......16
King J. M. & Co., Waterford, N. Y...... 6
Marcellus C. N. & Co., 91 Liberty, N. Y......
Sellers Wm. & Co., Phila. and 79 Liberty st., N. Y..37
Stockwell Screw Machine Co., Cleveland, Ohio...36
Mallets.
N. Y. Handle and Mallet Works, 456 E. Houston....13
Penfield Block Works, Lockport, N. Y......28
Measuring Tapes.
Eddy Geo. M. & Co., 353 Classon Ave., Brooklyn, N.Y.10
Meat Cutters.
Kimball Shovel Co., Baltimore, Md......29
Lloyd, Supplee & Walton, Philadelphia, Pa......21
Murray Iron Works, Burlington, Iowa......10
Metals.
Dickerson, Van Dusen & Co., 29 and 31 Cliff, N. Y... 2
Goldsmith Moses & Son, Charleston, S. C...... 3
Naylor & Co., 99 John, N. Y......30
Northrop A. C., Waterbury, Conn...... 2
Phelps, Dodge & Co., Cliff, bet. John & Fulton, N.Y. 2
Phosphor Bronze Smelting Co., Limited, 2038 Washington av., Phila......20
Purves A. & Son, cor. South and Penn, Phila...... 5
Quincy J. W., 98 William, N. Y...... 6
Read D. W. R. & Co., 205½ Walnut, Phila...... 5
Schoenberg Metal Mfg. Co., 528 & 530 E. 20th, N. Y.. 3
Starr John, Halifax, Nova Scotia......30
Metals, Perforated Sheet.
Harrington & Oglesby, Chicago, Ill......
Metallurgists.
Booth, Garrett & Blair, 919 Chant, Philadelphia...... 5
Britton J. Blodgett, 330 Walnut, Philadelphia......24
Mica.
Peckham J. S. & M., Utica, N. Y......21
Mine Lamps.
Leonard Bros., Scranton, Pa......25
Miners' Candles, *Makers of.*
James Boyd's Sons, 10 and 12 Franklin, N. Y......28
Mineral Wool.
Elbers Alexander D., 26½ Broadway, N. Y......17
Molding Sand.
Whitehead Bros., 517 W. 15th, N. Y...... 3
Mouse Traps.
Dietz R. E., 54 and 56 Fulton, N. Y......38
Jones Claudius & Co., Erie, Pa...... 7
Ripley Mfg. Co., Unionville, Conn......21
Nails.
Fuller Bros. & Co., 139 Greenwich, N. Y...... 4
Oxford Iron Co., 81 Washington, N. Y...... 4
Rowland Jas. & Co., 920 N. Delaware, Ave., Phila. 5
Schoenberger & Co., Pittsburgh, Pa...... 4
Zug & Co., Pittsburgh, Pa...... 4
Nail Machinery.
Pittsburgh Mfg. Co., Pittsburgh, Pa......36
Nickel Platers' Supplies.
Condit, Hanson & Van Winkle, Newark, N. J......29
Wharton Joseph, Philadelphia, Pa......29
Zucker & Levett, 540 to 544 West 16th st., N. Y......23
Norway Shapes, *Rollers of.*
Naylor & Co., 99 John, N. Y......30
Rowland Wm. & Harvey, Frankford, Philadelphia.38
Nuts, Bolts, etc., *Makers of.*
Allentown Rolling Mill Co., Allentown, Pa...... 5
Haskell W. H. & Co., Pawtucket, R. I......35
Russell, Burdsall & Ward, Port Chester, N. Y......38
Standard Nut Co., Pittsburgh, Pa......35
Sternbergh J. H., Reading, Pa......38
Oil, Lubricating.
Belmontyle Oil Co., 150 Front, N. Y......29
Meriam & Morgan Paraffine Co., Cleveland, O......30
Oil Stones.
Boyd & Chase, 107th and Harlem River, N. Y......30
Ores.
Jackson Iron Co., Cleveland, O...... 6
Llera J., 77 William, N. Y...... 6
Pullman J. Wesley, 407 Walnut Philadelphia...... 5
Read D. W. R. & Co., 205½ Walnut, Philadelphia.. 5
Ox Shoes.
Greenfield Tool Co., Greenfield, Mass......24
Packing.
Akron Rubber Co., Akron, O......13
Katzenstein L. & Co., 35 Desbrosses, N. Y......37
Patent Solicitors.
Howson & Son, Phila. and Washington, D. C......25
Stetson Thomas D., 23 Murray, N. Y......25
Tracy, Dyer & Wilber, Cleveland, O......29
Pens, Steel.
Esterbrook Steel Pen Co., New York......13
Phosphor Bronze.
Kaufman A., 36 Park Place, N. Y......25
Phosphor Bronze Smelting Co., Limited, 2038 Washington ave., Philadelphia......20
Picks, *Makers of.*
Pierson & Co., 24 Broadway, N. Y...... 4
Pipes, Fittings, etc., *Makers of.*
McNab & Harlin Mfg. Co., 56 John, N. Y......35
Pancoast & Maule, 227 Pear Philadelphia......34
Pipe, Water and Gas, *Makers of.*
McNeal A. H. & Bro., Burlington, N. J...... 6
Mellert Foundry and Machine Co., Limited, Reading, Pa......10
Reading Iron Works, Philadelphia, Pa...... 5
Wood R. D. & Co., 400 Chestnut, Philadelphia......13
Wyckoff A., Elmira, N. Y......29
Plane Irons, *Manufacturers of.*
Buck Bros., Millbury, Mass......21
Greenfield Tool Co., Greenfield, Mass......24
Planes, *Manufacturers of.*
Greenfield Tool Co., Greenfield, Mass......24
Laflin Mfg. Co., Westfield, Mass......29
Stanley Rule and Level Co., 29 Chambers, N. Y...... 3
Plated Ware.
Hall, Elton & Co., 75 Chambers, N. Y......11
The Wm. Rogers Mfg. Co., Hartford, Ct......11
Plumbers' Materials, *Manufacturers of.*
Carr Wm. S. & Co., 106 Center, N. Y......25
Everhart Jas. M., Scranton Pa......38
Pocket Knives.
Boker Hermann & Co., 101 Duane, N. Y......28
Pots and Kettles. Tea and Coffee.
Ideal Coffee Pot Co., Philadelphia, Pa......33
Purvis R. C., Philadelphia......21
Power Hammers.
Dienelt, Eisenhardt & Co., Philada., Pa......36
Presses, Fruit and Vegetable.
Mohawk & Hudson Mfg. Co., Waterford, N. Y......24
Presses, Power. *Makers of.*
Bliss & Williams, 167 Plymouth, Brooklyn......36
Merriman A. H., West Meriden, Conn......37
Peerless Punch & Shear Co., 52 Dey, N. Y......37
The Stiles & Parker Press Co., Middletown, Ct......38
Pulleys.
Oesterline W., Cincinnati, O......
Penfield Block Works, Lockport, N. Y......28
Providence Tool Co., Providence, R. I......21
Pumps, *Makers of.*
Douglas W. & B., Middletown, Conn...... 7
Gunnison A. B., Erie, Penn......25
Hartford Compressed Air Pump Co., Hartford Conn......24
Pulsometer Steam Pump Co., 83 John, N. Y......34
Rumsey & Co., Seneca Falls N. Y...... 7
Rumsey L. M. & Co., St. Louis, Mo......34
Union Mfg. Co., 96 Chambers, N. Y......12
Rails, Iron and Steel, *Makers of.*
Allentown Rolling Mill Co., Allentown, Pa...... 5
Bates & Despard, 117 Pearl, N. Y...... 4
Cambria Iron Co., Johnstown, Pa...... 5
Cleveland Rolling Mill Co. Cleveland, Ohio......30
Montour Iron & Steel Co., Danville, Pa...... 3
The Edgar Thomson Steel Co., 57 Broadway, N. Y..31
Razors.
Tower L. C., Rochester, N. Y......10
J. R. Torrey Razor Co., Worcester, Mass......10
Rivets.
Falls Rivet Co., Cuyahoga Falls, Ohio......11
Gilmor Wm., of Wm., Baltimore, Md......38
Grundy Geo. C., 165 Greenwich, N. Y......25
Hoopes & Townsend, Philadelphia, Pa......35
Townsend W. P. & Co. Pittsburgh, Pa......35
Rock Breakers.
Blake Crusher Co., New Haven, Conn......34
Farrel Foundry and Machine Co., Ansonia, Conn..34
Gates & Scoville Iron Works, Chicago, Ill......38
Rolls (Chilled).
Garrison A. & Co., Pittsburgh, Pa...... 6
Roofing.
New T., 39 John, N. Y......25
Rules, *Manufacturers of*
Stanley Rule and Level Co., 29 Chambers, N. Y...... 3
Sad Irons.
Chalfant Mfg. Co., 435 Arch, Philadelphia......13
Enterprise Mfg. Co., Philadelphia......27
Sand and Emery Paper, *Makers of.*
Baeder, Adamson & Co., 730 Market, Philadelphia..
Sand Sifter.
Riehlé Bros., Philadelphia, Pa......10&21
Sash Locks.
Universal Sash Lock Co., Albany, N. Y......24
Saw Sets.
Farr Asa, 64 College Place, N. Y......21
Saws, *Makers of.*
Boynton E. M., 80 Beekman, N. Y......38
Disston Henry & Sons, Phila......32
Farmers' Mfg. Co., Cincinnati, O......29
Gerlach Peter & Co., Cleveland, Ohio......
Wheeler, Madden & Clemsen Mfg. Co., Middletown, N. Y......32
Scales, *Manufacturers of.*
Buffalo Scale Co., Buffalo, N. Y......13
Chatillon John & Sons, 91 Cliff, N. Y...... 9
Olsen Tinius & Co., Philadelphia......21
Riehle Bros., 9th above Master, Phila......10&21
Weeks & Ray, Buffalo, N. Y......11
Screws, *Makers of.*
Billerbeck J., 17th and Venango Sts., Philadelphia.33
Miles F. S., 205 Quarry, Phila......13
Philadelphia Screw Co., Philadelphia, Pa......34
Screw Cutting Machinery.
Wiley & Russell Mfg. Co., Greenfield, Mass......34
Screw Drivers, *(Improved) Makers of*
Disston Henry & Sons Phila......32
Scythes.
Beardsley Scythe Co., West Winsted, Conn......30
Scythe Stones.
Pike A. F., Pike Station, N. H......11
Shafting, Makers of.
Sellers Wm. & Co., Phila. and 79 Liberty st., N. Y..37
Shears.
Renz Hardware Co., Bridgeport, Conn......10
Shears, Iron.
Hull J. E., Cincinnati, O......35
Shears (Sheep).
Field Alfred & Co., 93 Chambers, N. Y......10
Hildick A. H., 12 Warren, N. Y......10
Ship Chandley.
Creed Geo. H., 103 Reade, N. Y......11
Shot, &c.
Sparks Thos. W., 121 Walnut, Philadelphia......25
Shovels, Spades and Scoops.
Griffiths Geo., Philada., Pa......
Kimball Shovel Co., Baltimore, Md......29
Shutters, Steel and Wood.
Clark & Co., 162 W. 27th, N. Y......24
Sifters.
Hunter J. M. & Co., Cincinnati, O......
Skates.
Peck & Snyder, 124 Nassau St. N. Y......25
Union Hardware Co., 87 Chambers, N. Y......32
Sleds.
Crosby, Sahler & Co., Rondout, N. Y......13
Smelting Works.
Philadelphia Smelting Co., 12th and Noble sts., Philadelphia......31
Reeves Paul S., 760 South Broad, Phila......38
Snaths.
Ross W. K., 97 Chambers, N. Y...... 7
Vermont Snath Co., Springfield, Vt......25
Speaking Tubes.
Ostrander W. R., 19 Ann N. Y......24
Spelter.
Manning & Squier, 113 Liberty, N. Y...... 2
Osgood F. & Co., Bergen Port, N. J......11
Spiegeleisen.
Wright Peter & Sons, 52 Broadway, N. Y...... 5
Spoons.
Holmes, Booth & Haydens, 49 Chambers, N. Y...2&11
The Wm. Rogers Mfg. Co. Hartford, Ct......11
Springs.
Cary & Moen, 234 W. 29th, N. Y...... 3
Gautier Steel Co., Ld., Johnstown, Pa......3&30
Rowland Wm. & Harvey, Frankford, Phila......38
Semple & Birge Mfg. Co., St. Louis, Mo......10
Steam Hammers, &c., *Makers of.*
Dienelt, Eisenhardt & Co., Philadelphia, Pa......36
Dudgeon Richard, 24 Columbia, N. Y...... 9
Steam Pumps, &c., *Manufacturers of.*
Cameron A. S., East 23d, N. Y......36
Clayton Steam Pump Works, 14 and 16 Water st., Brooklyn, N. Y......38
Crane Bros. Mfg. Co., Chicago, Ill......36
McGowan John H. & Co., Cincinnati, O......37
Storer J. W., 132 N. 2d, Philadelphia......36
The Norwalk Iron Works Co., So. Norwalk, Ct. 35
Valley Machine Co., Easthampton, Mass......37
Steel Castings, *Manufacturers of.*
Chester Steel Castings Co., 407 Liberty, Phila., Pa 38
Eureka Cast Steel Co., Chester, Pa......38
Flagg Stanley G. & Co., Philadelphia......38
Pittsburgh Steel Casting Co., Pittsburgh, Pa......38
Steel Importers.
Carr J. & Riley, 30 Gold, N. Y......30
Hobson Francis & Son, 97 John, N. Y......30
McCoy & Co., 134 and 136 Duane, N. Y......10
Pierson & Co., 24 Broadway, N. Y...... 4
Wolff, Kahn & Co., 46 Cliff, N. Y......30
Steel (Mushet's Special.)
Jones B. M. & Co., 11 and 13 Oliver, Boston, Mass.. 30
Steel Manufacturers.
Albany & Rensselaer Iron & Steel Co., Troy, N. Y..30
Atha, Benjamin & Co., 241 Pearl, N. Y......30
Cleveland Rolling Mill Co., Cleveland, O......30
Gautier Steel Co., Ld., Johnstown, Pa......3&30
Midvale Steel Works, Nicetown, Phila., Pa......6&30
Miller, Metcalf & Parkin, Pittsburgh......30
Naylor & Co., 99 John, N. Y......30
Pennsylvania Steel Co., 208 S. 4th, Phila...... 6
Philadelphia Steel Forge, Philadelphia, Pa...... 6
Rowland Wm. & Harvey, Frankford, Phila......38
Sanderson Geo. & Co., 30 Gold, N. Y......30
Smith, Sutton & Co., Pittsburgh, Pa......30
Singer, Nimick & Co., Pittsburgh, Pa...... 6
Spencer J. R. & Son, Sheffield, England......10
Standard Steel Works, Philadelphia, Pa...... 5
The Edgar Thomson Steel Co., 57 Broadway, N. Y 30
The Steel Co. of Scotland, 72 Pine, N. Y......30
Wardlow S. & C., Sheffield, England......31
Steel Spiral Springs, *Manufacturers of.*
Cary & Moen, 234 W. 29th, N. Y...... 3
Chatillon John & Sons, 91 and 93 Cliff, N. Y...... 9
Steel Tube Cleaners.
The Chalmers-Spence Co., foot 9th St., E. R., N. Y. 34
Stocks and Dies.
Holroyd & Co., Waterford, N. Y......13
Wiley & Russell Mfg. Co. Greenfield, Mass......34
Stoppers, Black Lead.
Taunton Crucible Co., Taunton, Mass......30
Stove Boards, *Manufacturers of.*
Ansonia Brass and Copper Co., 19 and 21 Cliff, N. Y. 9
Stove Trucks.
Tucker Alarm Till Mfg. Co., Indianapolis, Ind......10
Strops, Razor.
Copeland, Hall & Co., Rochester, N. Y......10
Torrey J. R. Worcester, Mass......10
Stump Puller.
Dorsey R. S., Indianapolis, Ind......10
Tacks.
American Tack Co., Fairhaven, Mass...... 8
Field A. & Sons, Taunton, Mass......13
Grundy Geo. C., 165 Greenwich N. Y......25
Phillips E. & Sons, South Hanover, Mass...... 9
Shelton & Co., Birmingham, Ct......
Taps and Dies.
Carpenter J. M., Pawtucket, R. I......38
Manning H. S. & Co., 111 Liberty, N. Y......37
Wiley & Russell Mfg. Co., Greenfield, Mass......34
Testing Machines.
Olsen Tinius & Co., Philadelphia, Pa......21
Thermometers.
Oswego Thermometer Works, Oswego, N. Y......25
Tower L. C., Rochester, N. Y......10
Tin Plate. *Manufacturers of.*
U. S. Iron and Tin Plate Co., Pittsburgh, Pa......
Tin Ware, Stamped and Japanned
Block David, 69 Bayard, N. Y......
Shepard Sidney & Co., Buffalo, N. Y......
Vogel William, Brooklyn, E. D., N. Y...... 3
Tool Chests
American Tool Co., 116 Chambers, New York......
Tools, Steam and Gas Fitters.
Armstrong F., Bridgeport, Ct......34
Saunders' Sons, Yonkers, N. Y......
Transportation Lines.
The Iron Line, 33 Coenties Slip, N. Y...... 6
Tree Pruners.
Lee E. S. & Co., Rochester, N. Y......24
Trowels.
Bruce Geo. W., 1 Platt, New York......20
Try Squares, Bevels, &c., *Makers of.*
Disston Henry & Sons, Phila......32
Tube Expanders.
Dudgeon Richard, 24 Columbia, N. Y...... 9
Tubes, Telescope.
R. J. Deakin, Philadelphia, Pa......10
Tubing.
Merchant & Co., 507 Market, Phila......27
Twist Drills, *Makers of.*
Morse Twist Drill & Mach. Co., N. Bedford, Mass...34
Upholsterers' Goods.
Turner & Seymour Mfg. Co. 81 Reade, N. Y......
Valves, Gas, Water and Steam.
Ludlow Valve Mfg. Co., Troy, N. Y......30
Mohawk & Hudson Mfg. Co., Waterford, N. Y......24
Varnish.
Berry Brothers, Detroit, Mich...... 7
Vises.
Hall Mfg. Co. 23 Dey, N. Y......21
Howard Iron Works, Buffalo, N. Y......30
Millers Falls Co., 74 Chambers, N. Y......21
Stephens Patent Vise Co., 41 Dey, N. Y......21
Watchman's Time Detector.
Imhauser, E., 212 Broadway, N. Y......32
Weather Strips.
Valentine W. T., Albany, N. Y......20
Wheels, Railroad.
Whitney A. & Sons, Philadelphia...... 6
Whetstones.
Pike A. F., Pike Station, N. H......11
White Lead.
Brooklyn White Lead Co., 182 Front, N. Y......32
Colgate Robert & Co., 287 Pearl, N. Y......32
Jewett John & Sons, 182 Front, N. Y......32
Lewis John T. & Bros., 231 S. Front, Phila., Pa......32
Window Balances.
Hugunin R. B., Hartford, Ct......10
Window Springs, *Makers of.*
Hammond W. S., Lewisberry, Pa......20
Wire, *Manufacturers of.*
Cary & Moen, 234 W. 29th, N. Y...... 3
Cleveland Rolling Mill Co., Cleveland, Ohio......30
Gautier Steel Co., Ld., Johnstown, Pa......3&30
Gilbert & Bennett Mfg. Co., 273 Pearl, N. Y...... 7
Griswold J. Wool, Troy, N. Y...... 2
Harrison Wire Co., St. Louis, Mo...... 2
Howard & Morse, 45 Fulton, N. Y...... 2
Prentiss Geo. W. & Co., Holyoke, Mass...... 2
Perkins & Choate, 23 Nassau, N. Y...... 2
Trenton Iron Co., Trenton, N. J...... 2
Washburn & Moen Mfg. Co., Worcester, Mass...... 2
Wire Goods, *Manufacturers of.*
Dufur & Co., 36 N. Howard st., Baltimore, Md...... 2
E. T. Barnum's Wire Works, Detroit, Mich...... 3
Gilbert & Bennett Mfg. Co. 273 Pearl, N. Y...... 7
Wire Nails.
American Wire Nail Co., Covington, Ky......21
Field A. & Sons, Taunton, Mass...... 9
HP. Nail Co., Cleveland, Ohio......28
Wire Rope, Iron and Steel, *Makers of.*
Broderick & Bascom, St. Louis, Mo...... 2
Hazard Mfg. Co., Wilkesbarre, Pa...... 2
New York Wire and Wire Rope Co., 23 Astor House, N. Y......29
Roebling's John A. Sons, Trenton, N. J...... 2
Wrenches, *Manufacturers of.*
Bemis & Call Hdw. & Tool Co., Springfield, Mass. 18&25
Coes A. G. & Co., Worcester, Mass......10
Coes L. & Co., Worcester, Mass......31
Girard Wrench Mfg. Co., Girard, Pa......10
Wringers.
Alexander T. J., Boston, Mass......25
Metropolitan Mfg. Co., 32 Cortlandt, N. Y......25
Peerless Wringer Co., Cincinnati, O......13
Zinc.
Hart Lucius & Co., 8 Burling Slip, N. Y...... 2



not be surprised at the proposal to make an immense increase in our pressures, and use 20 atmospheres. We have already made a greater movement in this direction in the past. We began with less than 1, and have within a comparatively short time advanced from 1 or 1½ to 10 atmospheres. It should not, therefore, be a matter of surprise when we are asked to use 20. Our progress, so far, has been gradual, and has been made in the face of some difficulties. This slow progress has made some difference. In making the great advance which is now asked we are met by some difficulties, but we must study the problem.

The boiler advocated by Mr. Sterling appears at first sight to be a step in the wrong direction. It is a question whether we have not come to a point for a new departure. The circular form is a good one for strength, but the speaker indicated that he thought we had possibly reached a limit to its endurance, because, as we increased the size and the pressures, we found it grew weak and was a very bad form for staying. If the pressures go on increasing, the strength must be gained from the stays rather than from the shell. The speaker concluded by saying that while at first he did not approve of the plan, he was changing his mind. "I, for one," said he, "begin to think quite favorably of Mr. Sterling's proposed boiler."

Mr. Holley spoke of the value of fire-brick checkers and lighters for boilers, and said it was a wonder that they have not come into use. He had used these with great success in an English boiler some years ago. He also mentioned the value of surface condensers, by which pure water may be had for the boiler feed. Gas fuel should have been mentioned by Mr. Sterling. Mr. Holley then said a few words on the economy attending the use of gas, and said that coal, even under the best conditions, can hardly be burned under a boiler with the same degree of certainty and economy as is possible with gas. His remarks were both pertinent and interesting.

Prof. Egleston remarked that locomotives should be transformed in such a fashion that the fuel going into their fire-boxes should be hot. When this is done, not only would there be a vast economy, but there would be an end of the smoke, for it would be prevented from forming and there would be a complete combustion. Some figures were then given in a general way, showing how great a loss is entailed by the present method of coal burning, and the saving was indicated.

Mr. Forney spoke of the thousands of locomotives running in this country, and the vast smoke nuisance which they caused. So great was this that the daily papers of Chicago were devoting whole columns to the subject, and publishing articles of an ostensibly high scientific character concerning smoke protection. The public interest there had been aroused by the great nuisance caused by the locomotives on the numerous roads and the smoke from the factories. Railway superintendents are giving their attention to the subject, but they have in many cases found that it was cheaper to let the engines make the smoke than to run without. They are ready to take the matter up and build smoke burners if the work can be done cheaply. Mr. Forney said he was in correspondence with a gentleman connected with the Hungarian state railways, and had recently had an account from him of his experiments with fire-brick in the locomotive boiler. The first experiment was made by lining the fire-box with brick, so that the water legs did not at any point come in contact with the fire. The hot gases, after being thoroughly burned, were at once passed into the tubes. Although the heating surface was diminished by an amount nearly equal to the whole area of the fire-box plates, the efficiency of the boiler did not appear to be diminished in the least. It was, in fact, equal to the ordinary boilers used on the road. He then made a separate fire-box of brick, but found that the intense heat which he obtained destroyed the tubes at the ends next the tube-sheet. To remedy this he had been trying a variety of metals. Copper and brass both failed, but the best results had been obtained with iron tubes. The high temperature is very desirable, but the question to be solved is how to make the tubes stand the intense heat. Mr. Forney asked the question in regard to gas-producing furnaces for boilers. How can the gas be made to burn without a regenerator? Some attempts were mentioned where trouble was found in igniting the gas from a gas producer.

Mr. Gordon said that some years ago he made a fire-brick oven in front of an ordinary boiler, using a shield to protect the tubes, &c. He could burn all the smoke and got a good flame, but found that he could not regulate the combustion of fuel. No economy resulted, for he could not control it. Though he tried it for six months, he could not save a pound of fuel.

Mr. A. Faber Du Faur spoke in regard to the frequent use which had been made during the several discussions of the name "Siemens gas." He said: "I protest against 'Siemens gas.' Gas producers were used in Germany as long ago as 1845—certainly as early as 1846-7—but we had no Siemens gas at that time. There is no difficulty in burning the gas without the regenerator. My father so burned it, though the gas was of very poor quality, in the years mentioned. All that is wanted is a good fire-brick chamber. I can see no difficulty in using it under a locomotive boiler."

Mr. Durfee said: "I have used gas from gas producers under boilers, and found no difficulty in doing so. The engineer—for I did not find it necessary to have a fireman—put a few shavings under the boiler, lighted them and turned on the gas. When he had too much steam, instead of opening the doors and wasting fuel in that way, he turned off the gas."

Prof. Egleston said that when speakers mention gas and speak of difficulty in burning it, they mean blast-furnace gas, which is poor, containing a large amount of carbonic acid. The gas from gas producers gives no trouble whatever in burning.

The next paper was on "Putting a New Crank Pin into the Engine of the Steamship Knickerbocker," by Mr. Louis Johnson, of New Orleans. The loss of the drawings with which it was to have been illustrated threatened to deprive this paper of some of its interest, but Mr. Lyne, who had seen them, volunteered to reproduce them upon the blackboard, which was done so quickly and neatly that when the sketches were completed the loss was not noticed. The paper was read by the secretary, as Mr. Johnson was not present. The paper treated of the removal of the parts of a broken pin in a distant port where no appliances were available, and where time was of the greatest value. The work was done by shrinking the eye upon the pin, upsetting the metal of the latter and reducing its diameter until it was sufficiently loose to be easily removed. This was accomplished by heating both eye and pin until red hot in a grate built about the end of the crank. The machinery was kept cool by iron plates hung up and by streams of water from hose. When the whole end of the crank was at a red heat the basket grate was removed, and the eye cooled by a stream from the hose. The contraction upon the red-hot pin was very violent, and a considerable reduction in section followed. When the whole was cool the pin was easily taken out by hand. The eye was enlarged by this operation, and to make the spare pin fill the opening from which the broken one was removed was a somewhat difficult job. It was impossible, without a long and costly delay, to get a new pin. The work of using the spare pin was accomplished by banding the pin with hoops, which were turned off as they were put on, and then heating the eye and forcing the pin into place. The hoops had then to be cut out by hand at the points where they crossed the middle of the key-ways which had been cut in both pin and crank eye. Although put in in what would seem to be a sort of makeshift manner, the pin is doing good service at the present time, and appears to be as sound as any part of the machinery. The whole job was done in five days, the work proceeding continuously.

The next paper was by Mr. F. F. Hemenway on "Mechanical Correctness." As there was no discussion, the next paper was at once taken up. It was by Mr. L. F. Lyne on

"PISTON ROD AND VALVE STEAM PACKING."

Mr. Lyne's paper was long, and was illustrated with fine and clear drawings upon the blackboard and on paper, illustrating the different varieties of packing mentioned in the paper.

In the historical notice with which the paper opened, James Watt was alluded to by Mr. Lyne as the inventor of the stuffing-box. On this point *The Iron Age* thinks he is mistaken. The device is probably much older. The earliest mention of it to which we can at this moment turn is in the double-acting pump of La Hire. A description of this pump was published in 1716 in the "Memoirs of the French Academy." The form in which it was then made differed, so far as we can learn, in no respect from that of Watt's. This was at least 19 years before Watt's birth. After taking up the leading systems of packing, Mr. Lyne gave an account of their chief features, discussed their advantages, and spoke of their practical disadvantages. He described a metallic packing which, carefully avoiding the faults which made some of the other systems impracticable, combined the features which he considered necessary for success, and which he thought were good and met all the requirements of the case.

Mr. Hemenway said that the packing which Mr. Lyne showed in his third sketch upon the board had been in use in a railroad shop where he worked 18 years ago, and where it was doing good work still. There were some changes made in the construction. They used no springs and no fiber in its construction. It was, as they built it, all metal.

Mr. Sterling said he had used it on 12 engines on the Elevated Railroad with the best of results.

Prof. Sweet spoke of the same form, and said that if the packing was invented at the date stated in the paper, his own invention antedated it some time. An engine at the Centennial had that kind of packing upon it. If we understood the professor's remarks, they were to the effect that he had invented the same device before 1878, at which time it was in use in several places. The packing, while clasping the rod so as to be steam-tight, followed all its motions freely.

At this point Mr. Holley offered the following resolution:

Resolved, That the thanks of the society be presented to the treasurer, Mr. Moore, for his prolonged, difficult and faithful service to the society as its acting secretary during the interval between the organizing and the present meeting.

In putting this resolution, President Thurston spoke most heartily in acknowledgment of Mr. Moore's "energetic and good-natured services under the most trying circumstances." The resolution was adopted.

The final paper was by Mr. A. R. Wolff, on "The Value of the Study of the Mechanical Theory of Heat." It was rather literary than technical, and was discussed gently and considerately by Mr. Worthington.

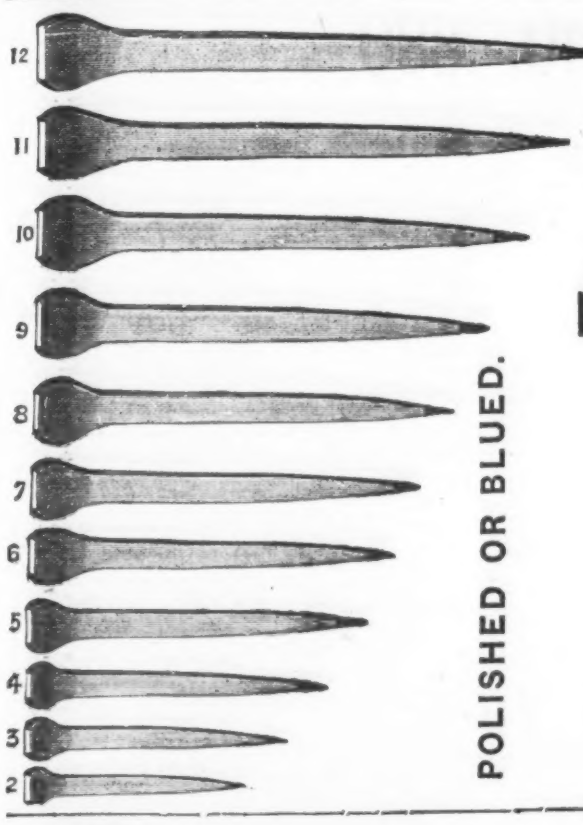
The chair then made a few remarks for the information of members with regard to the regulations for holding future regular and special meetings, after which the meeting adjourned. No young society ever made a better start in life, and all who attended the meetings went home well pleased and benefited.

Production of the Mines and Metallurgical Works of Austria in 1879.—The Austrian government has just published the statistics of the production of the mines and metallurgical works of Austria for the year 1879. The following are the data of the works given in metric cwts.:

Silver	295.35
Quicksilver	4,285
Copper	2,582
Mill pig	2,559,531
Foundry pig	208,864
Lead	59,803
Litharge	32,012
Zinc	32,807
Tin	332
Antimony	846

The following is given as the production of the mines in cwts.:

Lignite	79,059,352
Coal	53,786,04
Iron ore	6,982,469
Manganese ore	34,333
Graphite	314,909



AUSABLE HORSE NAILS,

Twisted, Bent and Drawn COLD.

Hot Forged and Cold Hammered Pointed,

Are the **only Nails in market** that are made in imitation of the **Hand Process.** They have **the uniformity of Machine** Nails and the **toughness** of those hammered by hand. Our

HOT FORGED AND COLD HAMMERED POINTED NAILS

Are the Standard Nails,

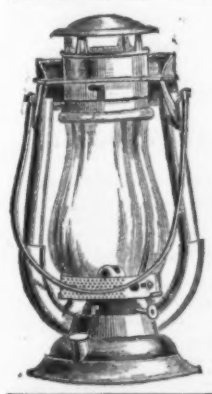
and are **acknowledged to be the best in the market.** They are used by the **best shoers** in **New York, Brooklyn, Philadelphia, Chicago, Saint Louis, Milwaukee, Baltimore,** &c., and

GENERALLY THROUGHOUT THE UNITED STATES.

They also compete successfully in Foreign Countries with machine and hand-made Nails of their own manufacture.

AUSABLE HORSE NAIL CO.,

4 Warren St., New York.



MILLER'S NO. 13 LANTERN

Gives more light and will hold the flame more perfectly than any other Lantern made.

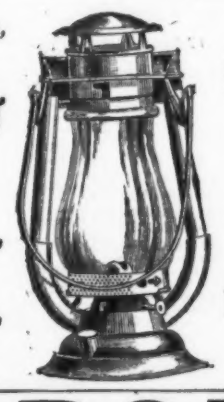
For Prices and Samples, address

Edw'd Miller & Co.,

Meriden, Conn.,

OR

35 Warren St., New York.



Manufacturers of

Lanterns,
Brass Kettles,
Machine Oilers
Kerosene Goods,
Tinners' Trimmings,
&c., &c.

PECK'S PATENT LIFTER & DROP PRESSES

Peck's Patent Lifter is the only Power Drop Lifter that has its parts cushioned. Being thus cushioned, they are the most durable Lifter in the market.

Our new Illustrated Catalogue sent on application.

BEECHER & PECK, 158 Temple St., New Haven, Conn.

Bridgewater Iron Co.,

Bridgewater, Mass.,

Manufacturers of

SEAMLESS DRAWN COPPER AND BRASS TUBES,

TACK PLATES,

Forgings of every description.

Bridgewater Iron Co.'s

HORSE NAILS.

PRICE LIST.

Nos.	5	6	7	8	9	10
Per lb.	26¢	23¢	21¢	20¢	19¢	18¢

Liberal discounts to the Trade.

73 Pearl Street, New York.

28 Broad Street, Boston.

CLOTHES WRINGERS.

Self-Adjusting Steel Elliptic Spring.

T. J. ALEXANDER, Manager,

BOSTON, MASS.

A. B. GUNNISON,

MANUFACTURER OF

WOOD PUMPS

ERIE, PA.

ESTABLISHED, - 1856.

Warranted Genuine

Cucumber Pumps & Pipe. Also Poplar Pumps, Lined Pumps, &c.

The Trade Supplied by

H. B. GRIFFING, 60 Cortland St., N. Y.

CLARK & MACKROTH, General Northwestern Agents, Minneapolis, Minn

KIRK & DICKSON, New Castle, Pa.

KNECHT & THOMAS, Winchester, Ind.

—AND BY—

A. B. GUNNISON

Manufacturer.

ERIE, PA.

NEW MAKE OF MINE LAMP.

LEONARD BROS., Scranton, Pa.

PHOSPHOR-BRONZE! PHOSPHOR-TIN!

Phosphor-Bronze is daily gaining favor with manufacturers who have to use a metal of great toughness and durability, of fine grain, high tensile strength and ductility, and is acknowledged far superior to any other alloy on account of the readiness with which it takes a polish, its elasticity, fluidity and beauty of color. Its high price, however, has so far prevented the use of it to so large an extent as its merit would warrant. For the first time an article is offered herewith which makes it easy for everybody to manufacture his own Phosphor-Bronze of the grade it is wanted, *by the simple process of melting.* This article is *PHOSPHOR-TIN.* By melting a very small quantity of it with copper an excellent Phosphor-Bronze is obtained at a much cheaper price than the ready made Phosphor-Bronze can be had in the market. A trial ought to be made by everybody who is using it.

A. KAUFMANN, 36 Park Place, New York,

Sole Agent for the United States and Canada.

For pamphlets please address the above, P. O. Box 2116, New York.

THE

"RIGHT SPEEDY" CORN SHELLER

Is the best Hand Sheller made; does the best work and works the best; is warranted five years.

Agents Wanted in every County.

Sample sent on receipt of $5.00.

Specially adapted for export.

Address Patentee and Sole Manufacturer,

CURTIS GODDARD

Alliance, Ohio, U.S.A.

WM. S. CARR & CO.

Sole Manufacturers of

CARR'S PATENT Water Closets,

PUMPS, CABINET WOOD WORK, &c.

106, 108 & 110 Centre Street,

Factory, Mott Haven, NEW YORK.

T. NEW'S PREPARED ROOFING

For steep or flat roofs. Applied by ordinary workmen at one-third the cost of tin. Circulars and samples free.

T. NEW, 39 John St., New York.

BARRETT, ARNOLD & KIMBALL, Western Agts., Chicago, Ill.

BROWNING, SISUM & CO., 85 Chambers St.,

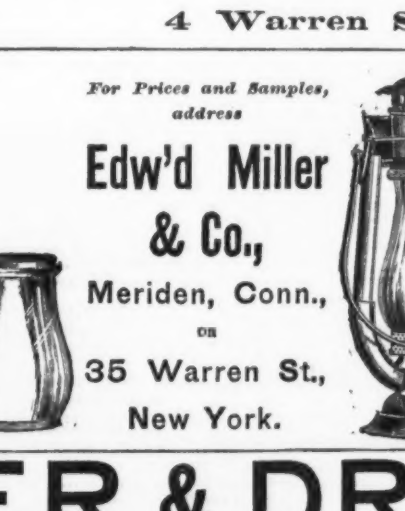
Manufacture

Belt Hooks, Cotters, Spring Keys, D Rings, Staples, and everything pertaining to wire bending. Factory, BROOKLYN.

FOUNDRYMEN'S METALLIC

Pattern Letters and Figures,

To put on patterns of castings. All sizes. Reduced prices. Mnfd. by H. W. Knight, Seneca Falls, N.Y.



THE GIANT PAD LOCK.

Manufactured by

THE SMITH & EGGE MFG. CO.

(Centennial Award.)

"Superior in Every Respect."

This is one of the **best selling Locks** in the market, and affords the dealer a large profit. It is thoroughly and strongly made—of the best material—very handsome in appearance, and every Lock is warranted. Orders solicited. Address as above

Lock Box 1705, Bridgeport, Conn.

Grant Fan Mill & Cradle Co.

Manufacturers of

Grant's Grain, Coffee, Rice, Cochineal and Pimento Fans,

and

TURKEY WING GRAIN CRADLES, 4, 5 and 6 fingers.

GRAPE VINE GRAIN CRADLES, 4 fingers.

SOUTHERN PATTERN GRAIN CRADLES, 4, 5 and 6 fingers.

All of a superior quality. None genuine unless marked *Grant Fan Mill and Cradle Co.* Send for illustrated catalogue and price list.

P. O. Address,

MELROSE, Rensselaer Co. N. Y.

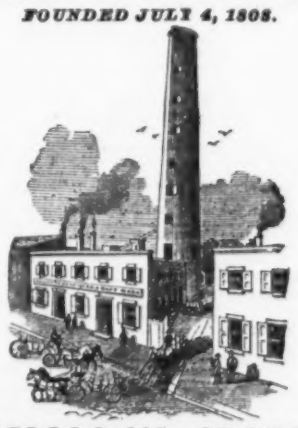
PATENTS.

THOMAS D. STETSON, 23 Murray St., N. Y.,

Patent Solicitor and Expert.

The Oldest Shot Tower in America.

FOUNDED JULY 4, 1808.



THOMAS W. SPARKS,

Manufacturer of

SPARKS' American Chilled Shot,

Rivaling the English and all Others.

STANDARD DROP & BUCK SHOT AND BAR LEAD.

121 Walnut Street, Philadelphia.

STAR LOCK WORKS.

ESTABLISHED 1836.

Trunk Locks, Pad Locks, Dead Latches, Door Springs, Trunk Stays, Keys, &c., &c.

110 South 8th St., and Sansom, bet. 8th and 9th, PHILADELPHIA.

PATENTED

Scand. Pad Locks With Flat Keys.

Shackel secured to the Lock Box.

HILLEBRAND & WOLF.

COBB & DREW

Plymouth, Mass.,

Manufacturers of Copper, Brass and Iron Rivets; Common and Swedes Iron, Leathered, Carpet, Lace and Gimp Tacks; Finishing, Hungarian, Trunk, Clout and Cigar Box Nails, &c. Rivets made to order.

NEW YORK AGENCY,

GEORGE G. GRUNDY,

HARDWARE,

165 GREENWICH STREET,

Agents for the Philadelphia Star Carriage and Tire Bolts.

THE

Sprague Novelty Works,

15, 17 & 19 North Water Street,

ROCHESTER, N. Y.,

Manufacturers of

Hardware Specialties,

SPRAGUE'S

"Perfection," "Combination" and other Razor Strops.

Refer to *The Iron Age* first issue of each month.

VERMONT SNATH CO.,

Manufacturers of

Pat. Swing Socket Snaths

and also a large variety of other styles of Snaths

Springfield, Vermont.

Represented in New York by Lamson & Goodnow Mfg. Co.

AGENTS IN ALL FOREIGN COUNTRIES.

HOWSONS PATENT OFFICES

119 South Fourth Street,

PHILADELPHIA

Branch Office, 605 Seventh St, Washington, D. C.

H. HOWSON, Engineer and Solicitor of Patents.

C. HOWSON, Attorney at Law and Counsel in Patent Cases.

SEND FOR CIRCULARS.

Established 1838.

Bevin Bros. Mfg. Co.,

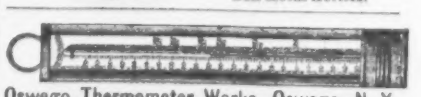
Easthampton, Ct.

Manufacturers of

SLEIGH BELLS,

House, Tea, Hand, Gong Bells, &c.

Bell Metal Kettles.



Oswego Thermometer Works, Oswego, N. Y.

Manufacturers of all kinds of Thermometers and Barometers and Pool's Storm Glass and Thermometer combined Send for circular, &c.

S. CHENEY & SON,

Manlius, N. Y.,

Small Gray Iron Castings.

We warrant our work for smoothness and finish.

New York Wholesale Prices, November 10, 1880.

HARDWARE.

Anvils.
Eagle Anvils American ... ⅌ ℔ 10c dis 20 %
Wright's ... 10½c
Armitage's Mouse Hole ... 9½ @ 9¾c
Trenton ... 10½c

Anvil, Vise and Drill.
Millers Falls Co., $28.00 ... dis 20 %

Augers and Bits.
Conn. Valley Mfg. Co. / Douglass Mfg. Co. / Humphreysville Mfg. Co / Ives / Beecher (French, Swift & Co) / Griswold / Nobles Mfg. Co. / Kasson's Patent } dis 40 % from list of Jan 7, 1880
Cook's, Douglass Mfg. Co ... dis 40&10 %
Snell Mfg. Co's C. S. Augers ... dis 40 %
" " B. Machine ... dis 40 %
" " C. S. Bits ... dis 40 %
" " Jennings' Bits ... dis 35 %
Patent Solid Head ... dis 30 %
Lewis' Patent Single Twist ... dis 33⅓
Russell Jennings' Auger, Dowel, Machine-Dowel and Hand-Rail Bits ... dis 10&10&10 %
Russell Jennings' Augers ... dis 16⅔&10&10&10 %
Russell Jennings' Car and Machine Bits, Boring-Machine and Millwrights' Augers dis 25&10&10&10 %
Imitation Jenning's Bits ... dis 40@45 %
Ives' "Jennings" Bits ... dis 33⅓&10 %
Andrews Bits ... dis 40 %
Expansive Bits, Clark's, small, $18; l'ge. $26 ... dis 25 %
" Ives ... $20 @ $30—dis 33⅓ %
" " Blake's ... $20—dis 40 %
" " Parmelee's ... $20 and $30 .dis 33⅓ %
Hollow Augers Ives' / " " French Swift & Co } dis 15 %
" " Douglas ... dis 15 %
" " Bonney's Adjust ... ⅌ doz $48—dis 25&10 %
" " Stearns' Adjust., ⅌ doz $48—dis 20&10 %
" " Ives' Expansive ... each $4.50—dis 30 %
" " Univ'sal Expansive, each $4.50—dis 20 %
Woods ... dis 25 %
Gimlet Bits ... $7.50 ⅌ gross, dis 45 %
" Diamond ... ⅌ doz $1.10 dis 20&10 %
" "Bee" ... dis 35&5 %
Double Cut Gimlet Bits Shepardson's ... dis 40 %
" " Ct. Valley Mfg. Co ... dis 30&10 %
" " Hartwell's ... dis 60&10 %
" " Douglass' ... dis 40 %
" " Ives' ... dis 50 %
Morse' Bit Stock Drill ... dis 25 %
L'Hommedieu's Ship Augers ... dis 15 %
Watrous Ship Augers ... dis 15 %
" Extension Lip ... dis 30 %

Awl Hafts.
Sewing Brass Ferrule ... $3.50 ⅌ gross—dis 40&10 %
" " ... 3.50 " dis 40&10 %
Patent Sewing, Short ... $1.00 ⅌ doz—dis 40&10 %
" " Long ... $1.40 ⅌ doz—dis 10 %
Patent Peg Plain Top ... $10.00 ⅌ gross—dis 40&10 %
" " Leather Top ... 12.00 " dis 40&10 %

Awls, Brad Sets, &c.
Awls Sewing, Common ... ⅌ gross $1.70—dis 25&10 %
" Shouldered Peg ... ⅌ gross 2.45—dis 25&10 %
Patent Peg ... ⅌ gross .63—dis 25&10 %
Shouldered Brad ... ⅌ gross $2.70—dis 25&10 %
Handled Brad ... $7.00 ⅌ gross—dis 20&10 %
Handled Scratch ... $7.00 ⅌ gross—dis 20&10 %
Socket Scratch ... $1.00@$1.25 ⅌ doz—net
Brad Sets, Aiken's ... ⅌ doz $17.00—dis 45&10 %
" No. 42, $10.50; No. 43, $12.50 ... dis 70 %
" Stanley's Excelsior, No. 1, $9.60 ... dis 20&10 %
" " No. 2, 4.80 ... dis 20&10 %
" " No. 3, 7.80 ... dis 20&10 %

Axes.
Single Bit, 4½ to 5½ and under ... ⅌ doz $11.00 net
4½ to 6 and over ... ⅌ doz $11.50 net
Beveled ... 50c ⅌ doz advance
Double Bit, 4½ to 5½ and under ... ⅌ doz $22.00 net
" 4½ to 6 and over ... ⅌ doz $23.00 net
" Beveled ... $1.00 ⅌ doz advance

Axle Grease.—Frazer's ... ⅌ ℔ 6c

Bag Holders.
Sprengle's Patent, per doz. $18 ... dis 40 %

Balances.
All Spring Balances ... dis 15&10 %

Bells.
Hand, Light Brass ... dis 60&10 %
" Extra Heavy ... dis 45 %
" White Metal ... dis 60 %
" Silver Chime ... dis 20&10 %
Globe (Cone's Patent) ... dis 25&10 %
Gong, Abbe's ... dis 45&10 %
" Yankee ... dis 30&10 %
" Barton's ... dis 30&10 %
Crank Taylor's ... dis 25&10 %
" Brook's ... dis 50&10&2 %
" Cone's ... dis 10 %
" Connel's ... dis 35 %
Lever, Sargent's ... dis 60&10 %
" Taylor's Bronze or Plated Lever ... net
" " Japanned Lever ... dis 25&10 %
" R. & E. M. Co.'s ... dis 50&10&2 %
Pull, Brook's ... dis 50&10&2 %
" Western ... dis 25&10 %
Call ... dis 25 %
Cow, Common Wrought ... dis 40&10&10 %
" Western ... dis 20&10 %
" Sargent's new list ... dis 40&10&10 %
" Kentucky "Star" ... dis 20&10 %
" " Sargent's new list ... dis 40&10&10 %
Dodge's Genuine Kentucky, new list—
Nos. 0, 1, 1½, 2, 3, 4, 5, 6, Hog
$12.00, 10.00, 9.00, 8.00, 6.00, 5.00, 3.50, 2.50, 5.00 } dis 50 %
Texas ... dis 30&10

Bellows.
Blacksmiths', Common ... dis 45 %
" Extra and Pittsburgh Pattern ... dis 20 %
Moulders ... dis 25 %
Hand Bellows ... List of Dec. 1, 1879, net

Belting, Rubber.
N. Y. Belting and Packing Co ... new list net

Bit Holders.
Extension, Barber's ... ⅌ doz $15.00—dis 40&5 %
" Ives' ... ⅌ doz $15.00—dis 40 %
Angonal ... ⅌ doz $24.00—dis 40 %
Augular ... ⅌ doz $24.00—dis 40 %

Blind Adjusters.—Domestic ... ⅌ doz $3.00, dis 15 %

Blind Fasteners.
Mackrell's ... per doz. pairs, $1.00, dis 10%
Van Sand's ... No. 2000, per gross, $10.00 ... dis 10 %
" old pattern ... ⅌ gross, $9.00 net
Washburn's Patent ... ⅌ gross $10.50 net
Merriman's ... new list net
Mackrell's ... ⅌ doz. pairs, $0.65, dis. 10 %

Blind Staples.
Barbed, ⅜ in. and larger ... ⅌ ℔ 12c net
" 5/16 in ... ⅌ ℔ 16c net

Blocks.
Differential Pulley Blocks ... dis 20 %
Penfield Block Works, Rope and Iron Strap'd ... dis 40 %
Wrot. Iron Com. bushed ... dis 25 %
all steel roll'r ... dis 10 %
Sheaves ... dis 35 %
Stanley R. & L. Co., Rope and Iron Strap'd ... dis 40&10 %

Bolts
Cast Iron Barrel, Shutter, &c ... dis 60&10 %
Cast Iron Chain (Sargent's list) ... dis 60&10&10 %
Bush's Lever and Chain Bolts ... dis 40 %
Ives' Pat. Door Bolts ... dis 40 %
Wrought Barrel ... dis 55&10 %
" Square ... dis 55&10 %
" Shutter, all Iron, Stanley's list ... dis 50&10 %
" " Brass Knob, " " ... dis 20&10 %
" " Sargent's list ... dis 55&10 %
" Sunk Flush, Sargent's ... dis 66⅔&10 %
" Stanley's ... dis 40&7½ %
" B.K.Flush, Com'n, Stanley's ... dis 50&6 %
" " Ex. Heavy " ... dis 40&10 %
" Plated Knob & Slide Flush ... dis 50&2½ %
Carriage and Tire, Common ... dis 70 @ 70&10 %
" " Philadelphia, new list ... dis 55 %
" " Philada. Pattern ... dis 70&10 %
Shelton's ... (old list) dis 60&10 %
R. B. & W. Carriage (old list) ... dis 65 %
Tire, Am. Screw Co.'s Phila, new list, Nov 1, '79, dis 60 %
" "Bay State ... dis 80 %
" R. B. & W., new list ... dis 60 %
Stove—American Screw Co.'s ... dis 40 %
" R. B. & W ... dis 40 %
Plow ... dis 40 %
" R. B. & W ... dis 40 %
Machine ... dis 65 %
Bolt Ends " ... dis 45&50 %

Borax ... 11½@12⅛c ⅌ ℔ net

Boring Machines. Upright. Angular.
First quality no Augers ... $5.50 $6.75 ... dis 40 %
Phillips' with Augers ... 6.60 7.00 net

Braces.
G. S. Backus ... dis 60 %
Wilson Mfg. Co ... dis 10 %
Barber's ... dis 40&5 %
Spofford's Patent ... dis 50&5 %
Noble's Patent ... dis 40&5 %
Ives' Patent Braces ... dis 50&10 %
Common Ball (American) ... dis 40&10 %
Amidon's ... dis 50 %
Barker's Impd ... dis 40 %
Empire ... dis 30 %
Buffalo Ball ... dis 40 %

Brackets.—Shelf (Sargent's) ... dis 60&10 %

Bright Wire Goods list of Dec. 15, 1879, dis 60&10 %

Bull Rings.—Union Nut Co ... dis 50&2½ %
Sargent's ... dis 65&10 %
Hotchkiss' ... low list dis 35%
Humason, Beckley & Co.'s ... dis 60&10 %

Butts.
Wrought Brass ... dis 45 %
Cast Brass, Tiebout's ... dis 30 %
" Corbin's ... dis 40&10 %
Fast Joint, Narrow ... dis 40&10 %
" Broad ... dis 40&10 %
Loose Joint ... dis 50&10 %
" Japanned ... dis 50&10 %
" with Acorns ... dis 45&10 %
" Japanned, with acorns ... dis 55&10 %
Parliament Butts ... dis 60&10 %
Mayer's Hinges ... dis 55&10 %
Loose Pin no Acorn ... dis 50&10 %
" Acorns ... dis 50&10 %
" Japanned ... dis 55&10 %
" Plated Tips ... dis 55&10 %
WROUGHT IRON.
Fast Joint Narrow ... dis 40&10 %
Lt. Narrow ... dis 40&10 %
Broad ... dis 40&10 %
Loose Joint, Broad ... dis 50&10 %
Table Butts, Back Flaps, &c ... dis 40&10 %
Inside Blind, Regular ... dis 25&10 %
" Light ... dis 40&10 %
Loose Pin, Wrt ... dis 50&10 %
Spring Hinges:
American Spiral Spring Butt Co., Jap'd ... dis 25 %
" " " " Fancy ... dis 20 %
Gem Spiral Spring Butts, Japanned ... dis 25 %
" " " " Ornamental ... dis 20 %
Geer's Spring and Blank Butts ... dis 25 %
Sabin Mfg. Co.'s Double Acting ... dis 35 %
Union Spiral Spring, Japanned ... dis 25 %
" " Ornamental ... dis 20 %
Union Spring Hinge Co.'s ... dis 25 %
American Spring Hinge Co.'s ... dis 25 %
Union Mfg. Co ... dis 25 %
Bommer's ... dis 25 %
Blind Butts, Parker ... dis 70 %
Palmer ... dis 35&10 %
Seymour ... dis 60&10 %
" Shepard's "Double Locking" Nos. 1 & 2 ... dis 60&10&10 %
Shepard's "Noiseless," Nos. 50 & 60 ... dis 60&10&10 %
" Lull & Porter ... dis 60&10 %
" Nicholson ... dis 45&10 %
" Huffer ... dis 50 %
" Clark's, Nos. 1, 3, 5 ... dis 60&10&10 %
" Sargent's No. 12 ... dis 70&10 %

Bow Pins.
Hotchkiss' ... low list net
Humason, Beckley & Co.'s ... dis 60 %
Sargent & Co's ... $19.70 and $21.10, dis 60&10 %

Butchers' Cleavers.
Humason & Beckley Mfg. Co ... dis 20 %
Bradley's ... dis 25 %
Beatty's ... dis 25&5 %

1	2	3	4	5	6	7	8
$16.50	19.00	21.50	24.00	27.00	30.00	33.50	36.50

Can Openers.
Messenger's Comet ... ⅌ doz $3.00, dis 25 %
American ... ⅌ gross $7.50, dis 10 %
Duplex ... ⅌ doz 25c, dis 15@20 %
Lyman's ... ⅌ doz $3.75, dis 20 %
No 4, French ... ⅌ doz $2.25, dis 55 %
No. 5, Iron Handle ... ⅌ gross $7.50 dis 10 %
Eureka ... ⅌ doz $2.50, dis 10 %
Sardine Scissors ... ⅌ doz $7.00, dis 55 %
Star ... ⅌ doz $5.00, dis 20@25 %
Sprague ... dis 50@10 %

Caps—Percussion, ⅌ 1000.
U. M. C., F. C. trimmed ... 50c / " F. L. ground ... 70c } dis 10&5%
U. M. C. Cen. fire ground ... 70c / " Double W. proof ... $1.40 } dis 10&5 %
G. D. & S. B ... 36c, dis 7½ %
Double Waterproof, in 1-10's ... $1.40 / Colt's Pistol, " ... 70c } dis 10&5 %
F. L ... 50c / E. B. 1-10, Trimmed ... 64c / E. B. 1-10 Ground Edge ... 70c } dis 10& 5 %
Musket, in 1-10's ... 75c net

Cartridges.—Rim ... dis 60&10 %
Central Fire ... dis 20 %

Cards.—Horse and Curry ... dis 10 %
Cotton ... dis 10 %
Wool ... dis 10 %

Carpet Stretchers.
Cast Steel, Polished ... ⅌ doz $5.00, dis 30
" Iron Steel Points ... ⅌ doz $2.00, dis 35 %
Bullard's ... dis 25 %

Casters.
Bed ... new list July, '80, dis 25&10 %
Plate and Shallow Socket " " dis 25&10 %
Deep Socket " " dis 25&10 %

Cattle Leaders.
Humason, Beckley & Co.'s ... dis 65&10 %
Sargent's ... dis 65&10 %

Chain.
Trace, 6½-1-2 ... ⅌ pair 79c / " 6½-10-3 ... ⅌ pair 70c / " 7-10-2 ... ⅌ pair 86c } dis 40 %
German Halter Chain, New list Oct. 22, '79 ... dis 40&10 %
" Coil, New list Oct. 22, '79 ... dis 40&10 %
Covert Halter, Hitching and Breast ... dis 35%
Oneida Halter Chain ... dis 33⅓ %
Galvanized Pump Chain ... ⅌ ℔ 10c net
Jack Chain, Iron ... dis 45 %
" Brass ... dis 30&10 %

Chalk.
White ... ⅌ gross 60c net
Red ... ⅌ gross 80c net
Blue ... ⅌ gross 100c net
White Crayons ... ⅌ gross 90 net

Chisels.
Socket Framing, Crossman ... dis 65&5 %
" " Buck Bros ... new list, dis 22½ %
" " Merrill ... dis 65&10 %
" " Witherby Tool Co ... dis 65&10 %
" " Douglass' ... dis 65&10 %
" Firmers. Crossman ... dis 65&5 %
" " Buck Bros ... new list, dis 22½%
" " Merrill ... dis 65&10 %
" " Witherby Tool Co ... dis 65&10 %
" " Douglass' ... dis 65&10 %
" Corner ... dis 65&10 %
Tanged Firmers extra ... dis 33⅓@40 %
" " Butcher's ... $5.00 @ $5.25 to
" " Spear & Jackson's ... 5.00 to
" " Buck Bros (Shank) ... 5.25

Clamps.
Iron, Providence Tool Co.'s, Wrt. Iron ... dis 25 %
Adjustable, Gray's ... dis 20 %
" Lambert's ... dis 20 %
" Snow's ... dis 40&5 %
" Hammer's ... dis 15 %
" Stearns' ... dis 15&10 %
Cabinet, Sargent's ... dis 65&10 %
Carriage Makers', Sargent's ... dis 65&10 %
Cord and Tape (T. & S. Mfg. Co.) ... dis 30 %

Clips, Axle.
Norway or Best ... dis 40&10%
Superior ... dis 45&10 %

Coal Hods.
Griffiths ... dis 33⅓ %

Cockeyes ... dis 25 %

Cocks, Brass.
Racking ... new list, July 10, '80 / Globe " " / Plain Bibbs " " / Ale and Beer " " } ... dis 40 %

Coffee Mills.
Board and Box ... new list, Jan., 1880, dis 35 %
Increase Wilson's ... net
Selsor's Pat ... $9.50, $10.50, dis 25 %
American (Enterprise Mfg. Co.) ... dis 20 %
French Steel ... dis 20%
The Swift (Lane Bros.) ... dis 0 %

Combined Dinner Pail and Lantern.
Per doz $15.00 ... dis 30 %

Compasses, Dividers, &c.
Compasses ... dis 55 %
Calipers ... dis 55 %
Dividers ... dis 55 %
Bemis & Call Co.'s Dividers ... dis 60&5 %
" " Compasses & Callipers ... dis 50&5 %
" " Wing & Inside or Outside ... dis 50&5 %
" " Double ... dis 60 %
" " Call's Pat. Inside ... dis 30 %
Cook's ... dis 25 %
Excelsior ... dis 50 %
Miller's Patent ... dis 25 %

Coopers' Tools.
Bradley's ... dis 15 @ 20 %

Corkscrews.—Humason & B ... dis 33⅓ %
Clough's Wire ... dis 25 %

Corn Knives and Cutters.—Bradley's ... dis 10 %
Wadsworth's ... dis 33⅓ %

Crow Bars.
Cast Steel ... ⅌ ℔ 8¼c
Iron, Steel Points ... ⅌ ℔ 6¼c

Curling Irons, &c.
⅜, ⅝, ¾ in., $1.80 2.00, 2.40 ... dis 10 %
Curling Tongs ... ⅌ doz $3.65, dis 10 %
Pinching Irons ... ⅌ doz 7.50, dis 20 %

Curry Combs.
Fitch's (List of No. 240, $1) ... dis 40 %
Hotchkiss' Novelty ... new list, July, 1880, dis 25 %
" Exclr. Supr. Champion ... dis 25 %
Lawrence ... new list, July 1880 dis 25 %
Lawrence, with detachable Mane Comb new list July 1880, dis 25 %
Rubber ... ⅌ doz $10.00, dis 15 %

Curtain Pins.—Silvered Glass ... net
White Enamel ... net

Cutlery.
Meriden Cutlery Co. (Table) ... net
Am. Miller Bro.'s Cutlery Co ... dis 25 %
Humason & Beckley, Pocket ... dis 33⅓ %
The Wm. Rogers Mfg. Co ... net
Naugatuck Cutlery Co ... list net
Aaron Burkinshaw's Pocket ... dis 25 %

Dog Collars.
Embossed Gilt ... dis 20 %
Leather ... dis 30 %
Brass ... dis 25 %

Door Springs.
Torrey's Rod ... ⅌ doz $2.10, dis 10 %
Gray's " ... ⅌ doz $1.70, net
Bee Rod ... ⅌ doz $1.70, net
Warner's ... dis 15&10 %
Gem (Coil)—
No. 1, Large, Japanned ... ⅌ doz $3.50 / No. 2, Medium, ... ⅌ doz 2.50 / No. 3, Small ... ⅌ doz 2.00 } list net
Challenge (Coil)— Nos. 9, 7, 6
Japanned ... ⅌ doz $2.00 2.50 3.50 / Coppered ... ⅌ doz 4.00 4.50 5.00 / Galvanized ... ⅌ doz 3.50 4.00 4.50 / Nickeled ... ⅌ doz 5.50 6.00 7.00 } is 10 %
Star (Coil)—For Cop'd, Nickel-Plated, &c. see list.
No. 4, ("Shoo Fly") Screen door size ⅌ doz $1.80 / No. 5, Screen Door Size ... ⅌ doz $2.00 / No. 6, Medium ... ⅌ doz 2.50 / No. 7, Large ... ⅌ doz 3.50 } dis 20 %
Sabin's Lever ..No. 1, $1; 2, $1.50; 3, $2; 4, $2.50; dis 30 %
Sabin's Boss ... No. 1, $5.40; 2, $4.20; 3, $3.00 dis 50 %
Sabin's Crown ... ⅌ doz $2.75, dis 50 %
Philadelphia ... 5 in., $5.00; 8 in., $7.00, dis 35 %
Barker's Concealed ... dis 20 %
Cowell's ... No. 1, $18.00; No. 2, $15.00 ⅌ doz, dis 50 %
Rubber, complete ... ⅌ doz $1.80, dis 10 %
Hercules ... dis 40 %

Drawing Knives.
Crossman's No. 1 ... dis 65&5 %
Merrill ... dis 65&10 %
Nobles Mfg. Co ... dis 15 %
Bradley's ... dis 35 %
Adjustable Handle ... dis 20 %
Witherby Tool Co ... dis 65&10 %
Douglass ... dis 65&10 %

Drills and Drill Stocks.
Blacksmiths' ... each $2.70 net
Blacksmiths Self Feeding ... each $7.50, dis 20 %
Breast P. S & W ... dis 20&10 %
" Hotchkiss ... dis 20 %
Breast, Wilson's ... dis 20 %
" Miller's Falls ... each $3.00, dis 25 %
Bartholomew's ... each, $2.50 dis 25&10 %
Ratchet, Merrill's ... dis 10 %
" Ingersoll's ... dis 25 %
" Whitney's ... dis 20 %
" Weston's ... dis 20 %
Moore's Triple Action ... dis 20 @ 25 %
Whitney's Hand Drill ... dis 50 %
Wilson's Drill Stocks ... dis 10 %
Automatic Boring Tools ... each $2.25, dis 20 %

Drill Chucks.—Morse's Beach Patent ... dis 30 %
" Adjust..each $10.00, dis 30 %
Danbury ... $8.00, dis 30 %

Egg Beaters.
Dover ... ⅌ doz. $2.50 net
National ... ⅌ doz $4.50, dis 33⅓ %
Family ... per gross $15; per doz., $1.50 net

Elevator Buckets.
Mill E. Buckets, light, 3½ to 10 in. (Duc's Improved) ⅌ 100 $15.00 @ $54.00, net
Mill E. Buckets, heavy, 5 to 10 inches (Duc's Improved) ⅌ doz $5.60 @ $10.20 net
Storehouse, (Duc's Patent) 12 to 17, $12.00 @ $20.00 ... net

Emery and Emery Paper.
Genuine Chester—Regular Nos ... ⅌ ℔
" " Flour and FF ... ⅌ ℔
" " in 10-lb. cans ... 2c extra
Washington Mills—Regular Nos ... ⅌ ℔ 8c
" Flour ... ⅌ ℔ 5c
Excelsior Mills, Regular Nos., Grain in kegs ... ⅌ ℔ 6c
" " " Flour and FF " ... ⅌ ℔ 4c
" " " 10-lb. cans ... ⅌ ℔ 9c
Wellington Mills, Grain ... ⅌ ℔ 10c net
" " Flour ... ⅌ ℔ 8c net
Hampden Emery Grain ... 5c net
" Flour ... 3c net
B. & A. Emery Paper ... dis 20@25 %

Enameled and Tinned Ware.
Kettles ... 45 %
Sauce Pans ... dis 30 %
Tinned Sauce Pans ... dis 30 %

Escutcheon Pins.
Iron ... dis 20 %
Brass ... dis 45 %

Escutcheons.
Door Lock ... Same discounts as Door Locks
Brass Thread ... dis 55 %
Wood ... dis 25 %

Faucets.
Fenn's ... dis 40 %
Fenn's Cork Stops ... dis 33⅓ %
Star ... dis 55&10 %
Frary's Patent Petroleum ... dis 20&10 %
Wood and Metallic ... dis 40 %
West's Patent Key ... dis 45 %
Metallic Key, Leather Lined ... dis 50 %
Cork Lined ... dis 70 %
Enterprise (Self Measuring) ... ⅌ doz, $36.00, dis 20 %

Felloe Plates ... ⅌ ℔ 10c, dis 10 %

Files.
Auburn ... $5.00 to £, dis 35 %
Arcade ... $5.00 to £, dis 20 %
Black Diamond, new list ... dis 30 %
E. M. Boynton's ... new list, dis 25 %
Nicholson ... (Nicholson List) dis 30 %
Madden & Cockayne File Co ... dis 20 %
Heller & Bros (new list) ... dis 15 %
Hiscox File Mfg. Co., new list ... dis 20 %
J. & Riley Carr ... 4.50 to £
Johnson & Bro ... dis 30 %
Butcher's ... 4.50 to £
Walter Spencer & Co.'s "Diamond" ... 4.50 to £
Fisher's ... 4.75 to £
Moss & Gamble ... 4.50 to £
H. Disston & Sons (new list) ... dis 30 %
Western (new list) ... dis 20%
Limet & Co. (French) ... $4.25 to £
Union File Works (new list) ... dis 30 %

Fluting Machines.
Knox, 4-inch Rolls ... $3.25 each / " 6 " " ... 4.00 " / " 8 " " ... 6.50 " } dis 10 %
Peerless, 4-inch Rolls ... 4.00 each net
" 5 " " ... 4.75 each net
Eagle, 3½-inch Roll ... $2.15, dis 10 %
" 5½ " " ... $2.85, dis 10 %
Eureka, No. 1, 7-inch Roll ... 6.00 each, dis 10 %
" No. 2 5-inch Roll ... 4.00 each, dis 10 %
Crown ... 4½-in. $3.50; 6-in., $4.00; 8-in. $6.50 each dis 10 %
Star ... 4½ in., $4.00; 6 in., $5.00 each dis 10
Crown Jewel ... 6 in., $3.40 each, dis 10 %
American, 5 in., $3; 6 in., $3.40; 7 in., $4.50 each, dis 10 %
Domestic Fluter ... 1.50 each net
Geneva Hand Fluter, No. 1 ... ⅌ doz $15, dis 20 %
Crown Hand Fluter, Nos. 1, $15.00; 2, $12.50; 3, $10.00 ⅌ doz ... dis 10 %
Shepard Hand Fluter ... No. 75 ⅌ doz $15, dis 10 %
" " " No. 90, $9.00; No. 110, $7.25;
" " " No. 100, $6.00 ⅌ doz ... net
Clark's Hand Fluter ... ⅌ doz $15.00, dis 20 %
Combined Fluter and Sad Iron ... ⅌ doz 15.00, dis 30 %
Buffalo ... ⅌ doz 10.00, dis 10 %

Fluting Scissors ... dis 45 %

Forks.
Hay, Manure and Spading ... dis 40&5 %
Plated "A 1, Rogers & Bro ... dis 33⅓&5 %
" Reed & Barton ... dis 33⅓&5 %

Fruit and Jelly Presses.
Enterprise Mfg. Co ... dis 20 %
American ... dis 20 %

Fry Pans.
Burnished, list as follows ... dis 60 %

No.	0	1	2	3	4	5	6	7	8
⅌ doz	$3.00	$3.75	4.25	4.75	5.25	6.00	7.00	8.00	9.00

"Acme" ... dis 45 %

Gauges.
Marking, Stanley's ... dis 45&10 %
" Chapin's ... dis 50&10 %
Wire ... dis 10 %
" Smith's Patent ... ⅌ doz $18.00, dis 40 %

Gimlets.
Nail and Spike ... dis 45 %
"Bee" Gimlets ... ⅌ gross $12.00 dis 60&10 %
"Eureka Gimlets ... dis 50 %
"Diamond Gimlets ... dis 40 %
Double Cut Shepardson's ... dis 40 %
" " Hartwell's ... dis 50 %
" " Ives' ... dis 50 %
" " Douglass' ... dis 40%

Glue Pots.
Tinned and Enameled ... dis 30 @ 35 %
Family, Howe's "Eureka" ... dis 40 %
" L. F. & C.'s "Handy ... dis 40 %

Grindstone Fixtures.
Sargent's Patent ... dis 70&10 %
Reading Hardware Co., new list ... dis 25&10 %
" " "Keystone" ... dis 25&10 %

Gun Wads.
U. M. C. B. E. 11 up ... $2.00 / " " 9 & 10 ... 2.30 / " " 7 & 8 ... 2.60 / " P. E. 11 up ... 3.10 / " " 9 & 11 ... 4.00 / " " 7 & ... 4.90 } dis 5&5 %

Halters.
Covert's Pat. Rope ... dis 50 %
Horse and Cattle Ties, Covert's ... dis 50 %

Hammers.
Maydole's ... dis 15 %
Cheney's ... dis 25 %
S. Hammonds (new list July 20, '80) ... dis 20 %
Humason & Beckley ... dis 50 %
Verree ... dis 5 %
Magnetic Tack, Nos. 1, 2, 3, $1.25, 1.50 and 1.75 dis 20&10 %
Warner & Noble's ... dis 10 %
Kip's ... dis 20 %
Yerkes & Plumb ... dis 15 %

Hand Cuffs and Leg Irons.
Providence Tool Co.'s Hand Cuffs, $15.00 ⅌ doz / " Leg Irons, $25 ⅌ doz } dis 10 %
Tower's ... dis 25 %

Handles.—Door or Thumb Latches—

Nos.	0	1	2	3	4	
Per doz	$0.80	1.00	1.18	1.35	1.50	dis 55&10 %

Roggin's Latches ... per doz 25c@40c net
Bronzed Iron Drop Latches ... ⅌ doz $0.90 @ 1.15 dis 10 %
Jap'd Store Door Handles—Nuts, $2.00; Plate $1.35 no Plate, $1.08 ... dis 10 %
Barn Door ... per doz $1.80, dis 10 %
Wrought Chest ... dis 60&10 %
Surface Chest, Sargent's list ... dis 60&10 %
Flush Chest ... dis 60&10 %
Lifting ... dis 55&10 %
Saw and Plane ... dis 40&10 %
Boynton's Pat. Loop Saw Handles ... dis 25 %
" Centennial Saw Handles ... dis 25 %
Hammer and Hatchet ... dis 20 %
Brad Awl ... ⅌ gross $2.00, dis 20&10 %
Hickory Firmer Chisel, assorted, ⅌ gross $4.50
" " " large, " 5.00
Apple " " assorted, " 5.00
" " " large, " 6.00
Socket " " assorted, " 3.00
" Framing " assorted, " 5.00
File, assorted, ⅌ gross ... 2.75
Auger, assorted, ⅌ gross ... 6.00
" large, " ... 7.00 } dis 20&10 %
Patent Auger, Ives' ... dis 25
" Douglass' ... ⅌ set $1.25, net
" Swan's ... ⅌ set $1, net

Hangers.
Barn Door, old patterns ... dis 50&10 %
" New England ... dis 60&10 %
Novelty ... dis 40 %
Challenge ... dis 50 %
Climax (Anti-Friction) ... dis 50 %
Sterling Improved (Anti-Friction) ... dis 60&10 %
Cheritree ... dis 50 %
Kidder's ... dis 40 %

Harness Snaps.
Henshaw's ... List of 1⅛ changed to 14.00, dis 50&10 %
Judd's ... " " " 14.00, dis 50&10 %
Fitch's (Bristol) " " 14.00, dis 50&10 %
Great Western ... dis 50&10 %
Hotchkiss' ... dis 10 %
Andrews' ... dis 50 %
Sargent's ... dis 60&10 %
"German ... dis 60&5 %
Covert ... dis 40 %
Covered Spring ... dis 50&10 %

Hatchets.
Isaiah Blood ... dis 15 %
Shingling, Nos. 1 2 3 ... ⅌ doz $7.25 $8.00 $8.75
Claw, Nos. 1 2 3 ... ⅌ doz 7.75 8.50 9.25
Lathing, Nos. 1 2 3 ... ⅌ doz 7.50 8.00 8.50
Hunt's ... dis 10&5 %
Shingling, Nos. 1 2 3 ... ⅌ doz $7.25 $8.00 $8.75
Claw, Nos. 1 2 3 ... ⅌ doz 7.75 8.50 9.25
Lathing, Nos. 1 2 3 ... ⅌ doz 7.50 8.25 9.00
Hurd's ... dis 33⅓
Shingling, Nos. 1 2 3 ... ⅌ doz $8.00 $8.50 $9.00
Claw, Nos. 1 2 3 ... ⅌ doz 9.00 9.50 10.00
Lathing, Nos. 1 2 3 ... ⅌ doz 8.00 .50 9.00
Yerkes & Plumb ... dis 30 %
Shingling, Nos. 1 2 3 ... ⅌ doz $7.50 $8.00 $8.50
Claw, Nos. 1 2 3 ... ⅌ doz 8.25 8.75 9.25
Lathing Nos. ... ⅌ doz 7.50 8.00 8.50
Simmon's ... dis 20 %
Shingling, Nos. 0 1 2 3 ... ⅌ doz $7.50 $8.00 $8.50 $9.00
Claw, Nos. 1 2 3 ... ⅌ doz 9.00 9.50 10.00
Lathing, Nos. 1 2 3 ... ⅌ doz 8.00 8.50 9.00
Broad, Nos. 1 2 3 4 ... ⅌ doz 9.00 10.00 12.00 14.00
" Nos. 5 6 7 8 ... ⅌ doz 16.00 18.00 20.00 22.00
Collins ... dis 10 %
Shingling, Nos. 1 2 3 ... ⅌ doz $6.00 $6.50 $7.00
Claw Nos. 1 2 3 ... ⅌ doz 6.50 7.00 7.50
Lathing, Nos. 1 2 3 ... ⅌ doz 6.00 6.50 7.00

Hay Knives.
"Lightning" ... ⅌ doz $20.00 net
Wadsworth's ... dis 33⅓

Hinges.
Gate, Western ... ⅌ doz $6.25, dis 60 %
" N. E ... ⅌ doz $10.13, dis 60&5 %
" N. E. Reversible ... ⅌ doz $6.50, dis 60 %
Gate, Clark's No. 1 ... ⅌ doz $0.00, dis 50 %
" N. Y. State ... ⅌ doz $9.50, dis 60 %
" Automatic ... ⅌ doz $12.50 dis 40 %
" Common Sense ... dis 10 %
" Seymour's ... dis 40&10 %
" Shepard's ... Nos. 10, 20 & 25, dis 50 %
Rolled Blind Hinges ... dis 60&10 %
Rolled Plate ... dis 60&10 %
Rolled Raised ... dis 60&10 %
Wrought Strap and T, list Dec. 20, '77 ... dis 45&10 %
Plate Hinges / "Providence" { 8, 10 & 12 in. $6.50 ⅌ 100 ℔ / over 12 in. $5.20 ⅌ 100 ℔ } ... dis 10 %
Screw Hook and Strap { 8, 10, 12 in., $6.75 ⅌ 100 ℔ / 14 to 36 in., $5.50 ⅌ 100 ℔ } dis 10 %
Heavy Welded Hook { 8 to 12 in., $6.75 ⅌ 100 ℔ / 14 in. & up, 5.50 ⅌ 100 ℔ } dis 10 %
Screw Hook and Eye { ⅝ & 1 in., 9c / ¾ in. 9c / ⅞ in. 10c / ⅝ in. 12c } dis 20 %

Hoes.—Riveted Shank ... per doz, $5.00; dis 35 %
Socket ... ⅌ doz $5.25, dis 35 %
Grub ... dis 15 %
Planters' ... dis 35 %
Scovill Pattern ... dis 20&10 %
Scovill Pattern, Handled ... dis 25 %
Hick's Pat. Solid C. S. Planters' ... dis 20&10 @ 30 %
" " Scovill Pattern dis 20&5 @ 35 %
Winsted & Lane, Planters ... dis 25 %
" " Scovill Pattern ... dis 20@25 %

Hooks.
Bird Cage, Sargent's list ... dis 60&10 %
Cotton ... dis 50 %
Cott on, Patented (N. Y. Mallet & Handle Wks), dis 30
Cotton (Humason & Beckley Mfg. Co.) ... dis 40 %
Belt. (new list Dec. 24, 1870.) ... dis 60&10 %
Bench—Hotchkiss', $5.00 ⅌ doz ... dis 10 %
" Weston's, No. 1, $10.00; No. 2, $9.00 ⅌ doz dis 25 %
" McGill's, $3.00 ⅌ doz ... dis 10 %
" Skinner's, $6.25 per doz ... dis 20 %
Clothes Line Sargent's list ... dis 60&10 %
" " Reading list ... dis 33⅓&10 %
Ceiling .. } Sargent's list ... dis 60&10 %
Harness. } Reading list ... dis 20&10 %
Coat and Hat, Sargent's list ... dis 60&10&10 %
" " Reading ... dis 33⅓&10 %
Picture Hooks, Brown's Pat. Solid Brass, $4 per gross ... dis 25 %
Tassel (T. & S. Mfg. Co.) ... dis 40 %
Wrought Staples and Hooks and Staples, dis 65&10&10 %
" Staples, Stanley's list ... dis 65&10 %
Wire Screw Hooks and Eyes, new list ... dis 60&10 %
Grass and Bush ... dis 40@45 %
Whiffletree—Patent ... dis 40 %
Hooks and Eyes—Malleable Iron ... dis 60&10 %
" Brass ... dis 60&10 %

Horse Nails

	Nos. 5	6	7	8	9	10	
Ausable ... ⅌ ℔	30c	27c	25c	24c	23c	22c	dis 20 %
" Finished, Polished or Blued ... "	31c	28c	26c	25c	24c	23c	

A C ... 60 50 40 30 27 25 23 22 21 21 20 20c } dis 15 %
Nos ... 1 2 3 4 5 6 7 8 9 10 1 12

	Nos. 5	6	7	8	9	10	
H. P. Pointed and Finished	26	23	21	20	19	18	is 20 %
National, Pointed	26	23	21	20	19	18c	dis 15&10%

Horse Shoes.—Burden ... ⅌ keg $4.37½
R. I. Horse Shoe Co., Perkins' Improved Light, Medium and Heavy ... ⅌ keg 4.37½
Mule Shoes ... ⅌ keg 5.37½

Ice Awls, Chisels, &c.
American Ice Chisel ... ⅌ doz. $3.50 net
National " ... ⅌ doz $0.25 dis 20 %
Novelty Ice Breakers ... ⅌ doz $0.25 dis 20 %
White's Sliding Head Picks ... ⅌ doz $2.50 dis 40 %
Dunlap's Ring Picks ... ⅌ doz $[illegible] dis 40&10 %
Wood Head Picks, Sargent's ⅌ doz $1.85, dis 60&10&10 %
Iron " ⅌ doz 1.85, dis 60&10&10 %
Ice Mallets Pick in Head ... ⅌ doz 1.75 net
Pick in Handle ... ⅌ doz 3.00 net
Ice Axes, Small, Cast or Malleable ... ⅌ doz 1.20 net
Kitchen Ice Tongs ... ⅌ doz 2.25 net
Combination Ice Tools ... ⅌ doz $200 net

Kettles.
Brass, 7 to 13 inches inclusive ... ⅌ ℔ 35c net
Brass larger than 13 inches ... ⅌ ℔ 38c net
Enameled ... dis 50 %

Knives.
Ames' Butcher Knives ... dis 20 %
" Shoe ... dis 15 %
" Bread ... ⅌ doz $1.50, dis 15 %
Moran's Shoe and Bread Knives ... dis 20 %
Hay and Straw—Wadsworth's ... dis 33⅓ %
Table and Pocket ... See Cutlery

Knobs.
Carriage (Jap'd 80c. ⅌ gross) ... dis 55 & 10%
Base—Common ... dis 30&10%
Hemacite Door Knobs ... New list, dis 35&5 %
Door, Mineral / " Por Jap'd / " " Plated / " " Por } Same discounts as Door Locks.
Furniture, Plain ... 75c gross inch, dis 10 %
Wood Screws ... dis 20 %
Picture (T. & S. Mfg. Co.) ... dis 50&10 %
" Sargent's ... dis 60&10 %
Hemacite Picture ... dis 35 %
Shutter, Porcelain ... dis 60&10 %

Ladles.
Melting—Sargent's ... dis 50&10 %
" Reading ... dis 20&10 %
" Monroe's Patent ... ⅌ doz $4.00, dis 40 %

Lanterns
Tubular ... No. 0, $8.65; No. 1, $10.15 / With Guards 35c extra } net
Hurricane No. 2 ... ⅌ doz $5.75, net
Peerless ... No 5, ⅌ doz $11.75, dis 10&10 %
Brady's Patent ... dis 10&10 %
Ætna ... dis 10&10 %
Yankee ... dis 10&10 %
De Beque ... dis 10&10 %
Police ... Small, $7.00; Med., $8.25; Large, $12.00, dis 10 %
Convex Reflector ... $2.75 ⅌ doz, dis 10 %

Lemon Squeezers.
Porcelain Lined ... ⅌ doz $6.00—dis 30 %
Wood ... ⅌ doz 3.00—dis 30 %
Eureka, Tinned ... ⅌ doz $8.00, dis 10 %
Dunlap's Improved ... ⅌ doz $4.00 net
Sammis' ... No. 1, $7.00; No. 2, $12.00 ⅌ doz., dis 45 %
Townsend's Patent ... $6.00 ⅌ doz., dis 33⅓ %

Lines.—Linen Fish ... dis 25&10 %
Cotton Chalk ... dis 55 %
Sil. Lake Chalk ... Nos. 0, 1, 2, 3, $6.00, $6.50, $7.00, $7.50 ... dis 25 %
Mason's Linen ... dis 25&10 %
Wire Clothes, Galvanized ... each 25 @ 50c net

Locks and Latches.
Cabinet—Eagle / " Gaylord / " Bridgeport } Changes made in list price of some numbers July 1, 1880, and also July 15, dis 10&2½ %
" A. E. Deitz ... dis 30@10 %
Trunk ... net
Langstroth & Crane's List Jan. 1, '77.
Round Key, No. 1 to 5 ... dis 40&10 %
" No. 5½ to 12 ... dis 40& 10 %
Flat Key ... dis 33⅓&10 %
A. E. Deitz, Flat Key ... dis 30 %
Yale Lock Co., Flat key ... dis 40 %
"Shepardson" or "U. S." ... dis 35 %
"Felter" or "American" ... dis 33⅓ %
Plate ... dis 33⅓&2 %
F. Many's "Extension Cylinder" ... $10.50 ⅌ doz, net
DOOR LOCKS, &C
Branford / Norwalk / Norwich / P. & F. Corbin / Russell & Erwin / Mallory, Wheeler & Co / Reading Hardware Co / Trenton Lock Co } New list June 10, 1880, dis 50&2 % cash
Padlocks—Russell & Erwin / " Mallory, Wheeler & Co / " Wm. Wilcox & Co } ... dis 40 % and 2 % for cash
" Yale Lock Mfg. Co.'s "Standard" ... dis 40 %
" Romer's ... dis 30 %
" Conestoga ... dis 60 %
" J. H. McWilliams ... dis 10 %
" A. E. Dietz ... dis 35 %

Mallets.—Hickory ... dis 10&10
" Lignumvitæ ... dis 10 %
Penfield Block Works, Lig., Apple & Hickory ... dis 30 %

Meat Cutters.
Dixon's (P. S. & W.) Nos. 1, 3, 4 — ⅌ doz $14.00 17.00 19.00 30.00—dis 30 %
Miles' Challenge ... Nos. 1, 2, 3 — ⅌ doz $22.00 30.00 40.00—dis 30 %
Perry's Nos. 1, 2, 3, 4, 4 g'rd, 5 g'rd — Each ... $3.00 4.00 5.00 11.00 13.00 36.00—dis 30 %
Woodruff's (P. S. & W.) ... Nos. 100, 150 — ⅌ doz $15.00 18.00 dis 30 %
Hales' ... Nos. 11, 12, 13 — ⅌ doz $27.00 33.00 45.00 ... dis 40&10&2 %
Draw Cut ... Nos 5, 2, 6, 8, 10 — Each ... $50.00 75.00 80.00 225.00 400.00—dis 20 %
American ... dis 25 %
Nos 1, 2, 3, 4, B, 5 — Each ... $5.00 7.00 10.00 25.00 50.00 60.00
Kieser's No. 55 ... $40 per doz., dis 40 %
" Gem ... $25 per doz., dis 40 %
Silver & Deming ... dis 25 %
Pennsylvania ... dis 50 %
Nos 1, 2, 3, 00 — ⅌ doz ... $24.00 28.00 36.00 28.00
Beef Shavers (Enterprise Mfg. Co.) ... dis [illegible]

Mincing Knives.
Am., (2d quality) per gross, 1 blade, $7; 2 blades, $12; 3 blades, $18 ... net
Lathrop's ... dis 15&10 %
Smith's ... per doz $1.75, dis 10 %
Cowles Hdw. Co ... dis 40&10 %

Molasses Gates.
Stebbins Pattern ... dis 60&10 %
" Genuine ... dis 47½&10 %
" Tinned Ends ... dis 40&10 %
Chase's Hard Metal ... dis 60&10 %
Bush's ... dis 50&10 %
Lincoln's Pattern ... dis 20%
Weed's ... dis 50&10 %
Boss, No. 1, 2, 3, 4 ... dis 15 %
$7.00 $8.00 $9.00 $10.00 per doz.
" Japanned Finish ... dis 50&10 %
" Bronze " ... dis 45&10 %

Nails ... See Trade Report

Nuts and Washers.
Square Nuts ... 7c off list
Hexagon Nuts ... 7c off list
Washers ... 6½c off list

Nut Crackers
Table (Humason & Beckley Mfg. Co.) ... dis 33⅓ %
Blake's Pattern ... ⅌ doz $3.00, dis 10 %
Turner & Seymour Mfg. Co ... dis 50 %

Oakum.
Best ... ⅌ ℔ 11c
U. S. Navy ... ⅌ ℔ 10c
Navy ... ⅌ ℔ 8¼c

Oilers.—Zinc and Tin ... dis 50 %
Brass and Copper ... dis 50 %
Malleable (Hammer's) ... dis 40 %
Prior's Patent or "Paragon Zinc ... ⅌ doz $5.00, dis 10 %
" " Brass ... dis 50 %
Olmstead's, Tin and Zinc ... dis 40 %
" Brass and Copper ... dis 50 %
Broughton's, Zinc ... dis 40 %
" Brass ... dis 30 %

Ox Balls ... dis 40&10%

Pencils.
Faber's Carpenters' ... High list, dis 40&10 %
" Round Gilt ... ⅌ gross $5.25 net
Dixon's Lead ... ⅌ gross 4.50 net
" Lumber ... ⅌ gross
Dixon's Carpenters' ... dis 40 & 10 %

Packing, Steam.
N. Y. Belting and Packing Co ... new list net

Picture Nails.
Brass Head, Sargent's List ... dis 50&10 %
" T. & S. Mfg. Co ... dis 40 %
Porcelain Head, Sargent's List ... dis 50&10 %
" " Judd's List ... dis 30 %
Porcelain Head, T. & S. Mfg. Co ... dis 33⅓ %
Niles' Patent ... dis 25 %

Pinking Irons ... ⅌ doz 75c. net

Plaiting Machines.
Magic ... ⅌ doz $10.00, net
Astor Plaiting Machine ... each $15.00, dis 20 %
Crown Plaiting Machines ... dis 25 %
6 in., $6.00, 10 in., $10.00 each

Planes and Plane Irons.
Bench, First Quality ... dis 25&7½ %
" Second " ... dis 30&7½ %
Moulding ... dis 25 %
Bailey's (Stanley R. & L. Co.) new list Jan. '79, dis 20&10 %
The Stanley (S. R. & L. Co.) " " dis 20&10 %
Bailey's "Victor" ... dis 20&10 %
Defiance Adjustable ... dis 20&10 %
Plane Irons, Butcher's ... $5.50 to £
" Buck Bros ... $5.00 to £
" Auburn Tool Co.'s ... dis 5&10 %
" The Globe Mfg. Co. "Baldwin Iron"
" Ohio Tool Co ... dis 5&10 %
" Sandusky Tool Co ... dis 5&10 %

Pliers and Nippers.
Button's Patent ... dis 33⅓ %
Hall's Pat. Compound Lever Cutting Nippers No. 2, 5 in., $20; No. 4, 7 in., $30 ⅌ doz ... dis 45 %
Humason & Beckley Mfg. Co ... dis 33⅓ %
Gas Pliers ... dis 50 %
Eureka Pliers and Nippers ... dis 25 %
Russell's Parallel ... dis 25 %
P. S. & W. Cast Steel ... dis 35 %
" Tinners' Cutting Nippers ... dis 15 %

Plumbs and Levels.
Disston's ... dis 70 %
Stanley R. & L. Co.'s Pat. Adjustable ... dis 60&10 %
" " " Non-Adjustable ... dis 50&10 %
Chapin's Patent Adjustable ... dis 60&10%
" Non-Adjustable ... dis 60&10 %
Standard Rule Co.'s New Adjustable ... dis 60&10 %
" " Non-Adjustable ... dis 60&10 %
Johnson's Patent Adjustable ... dis 60&10 %
Pocket Levels ... dis 60&10 %
Davis' Inclinometers ... dis 20 %

Post Hole and Tree Augers.
Samson Post Hole Digger ... per doz $37.50, dis 20 %
Fletcher Post Hole Augers ... ⅌ doz 36.00, dis 20 %
Vaughan's Post Hole— 6 in. $23.60; 7, 8 and 9 in. $25 per doz ... dis 15&10 %
Eureka Diggers ⅌ doz. $40.00 ... dis 25&10 %

Pruning Hooks and Shears.
Disston's Combined Pruning Hook and Saw per doz $19.00, dis 20 %
" Pruning Hook ... " 12.50, dis 20 %
E. S. Lee & Co.'s Pruner ... dis 30 %
Pruning Shears ... ⅌ doz $5.50@$6.00

Pulleys.
Hot House and Tackle ... dis 60&10 %
Jap'd Screw ... dis 60&10 %
Brass Screw ... dis 60&10 %
Jap'd Side ... dis 60&10 %
" Clothes Line ... dis 60&10 %
Hay Fork Solid Eye, $4.50; Swivel, $5.00, dis 40&10&10 %
" " "Anti-Friction," ... $7.50 dis 20&10 %
" " "F" Common and Pat. Bushed ... dis 20 %
" " Tarbox Pat. Iron ... dis 20 %
Shade Rack ... dis 50 %

Punches.
Belt or Drive ... ⅌ doz $2.00; 2.25; 2.50, dis 50 %
Bemis & Call Co.'s Cast Steel Drive ... dis 50&5 %
" " Springfield Socket ... dis 50&5 %
Spring ... ⅌ doz $7.00, dis 50&5 %
Leach's Patent ... dis 15%
Bemis & Call Co.'s Spring and Check ... dis 40 %
Solid, Tinners' ... ⅌ doz $[illegible], dis 40 %

Rail.
Sliding Door Wrought Brass.....₩ lb 42c dis 20 %
" " Iron, Painted .₩ foot 10c.dis 60&10 %
Barn Door....Inch..... ⅜ ½ ⅝
Per 100 feet. $2.00 3.00 5.00—dis 10 %
" for N. E. Hangers—
Small. Med. Large.
Per 100 feet. .. ..$2.10 2.70 3.30—net

Razors.
J. R. Torrey Razor Co.....dis 10 @ 20 %

Razor Straps.
Genuine Emerson.....dis 40@50 %
Badger's Emerson.....dis 40
Badger's (not Emerson).....dis 25 %
Evans'.....dis 40 %
Imitation Emerson.....₩ doz $2.00, dis 20 %
Grant's. .....dis 40@5 %
Chapman. .....dis 15 @ 20 %
Saunder's.....dis 10 %
Torrey's.....dis 20 %

Rivets.
Iron and Tinned.....dis 50 %
In bulk, list of May 31.....dis 30 %
Copper Rivets and Burs.....dis 35 %
Nos.. 7 8 9 10 11 12 13 14 15
₩ lb..49c 50c 52c 54c 56c 58c 60c 65c 70c
Tinned Iron Belt Rivets and Burs.....dis 30 %
Rivet Sets.....dis 40 %

Rods.
Stair.....New , March 1 '79, 10 %
" American Patent.....dis 20 %

Rollers.
Barn Door, Sargent's list.....dis 55&10 %
Noveity.....dis 10 %
Acme (Anti-Friction).....dis 50 %

Rope. Manufacturers' Net List, Sept. 20, 1880
Manila.....½ inch and larger ₩ lb 13 c
" .....⅜ inch ₩ lb 13½c
" .....¼ and 5-16 inch ₩ lb 14 c
" Tar'd Rope.....₩ lb 12½c
" Lath Yarn.....₩ lb 12½c
" Hay Rope.....₩ lb 13 c
Sisal.....½ inch and larger ₩ lb 10½c
" .....⅜ inch ₩ lb 11 c
" .....¼ and 5-16 inch ₩ lb 11½c
" Hay Rope.....₩ lb 10½c

Rules. Boxwood. Ivory
Chapin's.. ....
Standard.... .....
Stanley.....
Stephens.....
} dis 6.&10 % } dis 50&10 %

Sad Irons.
Sad Irons, From 4 to 10 lbs.....₩ lb 37½c net
Self Heating.....₩ doz $2.50 net
" Tailors'.....₩ doz $18.00 net
Gleason's Shield and Toilet.....dis 25 %
Enterprise Patent Cold Handle .....dis 30 %
Mrs. Pott's Pat. Cold Handle, "Crown".....dis 30 %
Combined Fluter and Sad Iron..per doz $12.00, dis 15 %

Sand Paper.
Baeder & Adamson's Flint, 00 to 1½..$4.75 ₩ ream
" " " 2, 2½ & 3. 5.25 ₩ ream
" " " Assorted 4.75 ₩ ream
" " Star..... 5.75 ₩ ream
" " Emery..₩ ream $6.50 @ 11.40
New England, same list as B. & A. Flint.... dis 20@25 %
Gage's.....dis 20&5 %

Sash Cord.
Common.....₩ lb 14 @ 20c net
Patent.....₩ lb 10c net
Silver Lake Russia Flax.....₩ lb 60c. dis 10 %
" White Cotton.....₩ lb 60c. dis 10 %
" Drab Cotton.....₩ lb 65c. dis 10 %
Raw Hide.....dis 25 %
Steel Ribbon.....dis 10 %

Sash Locks.
Clark's, No. 1, $10.00; No. 2, $8.00 per gross.....dis 33⅓%
Ferguson's.....dis 33⅓ %
Walker's.....net
Hammond's Window Springs.....dis 25 %
Northup Window Springs.....$9.00 per gross, dis 10 %
The Perfect, Clark & Smith, Plain Jap'd ₩ gro $10.00 net
" " Por.Knob Jap'd.₩ gro 14.00 net
" " Nickel-Plated...₩ gro 27.00 ne

Sash Weights.—Solid Eyes, in 500 lb lots and over..... .....₩ lb 2¾c net

Sausage Stuffers or Fillers.
Miles.....₩ doz $20, dis 30 %
Perry.....₩ doz, No. 15: No. 0, $21, dis 30 %
Draw Cut No. 4.....each $30.00, dis 20 %
Enterprise Mfg. Co.....dis 20 %
Silver's.....dis 25%

Saws.
Disston's Circular.....dis 35 %
" Mill.....dis 25 %
" Cross Cut.....dis 25 %
" Hand, Panel, Rip, &c.....dis 20 %
Boynton's Lightning, Cross Cuts, new list.....dis 20 %
" One-Man, all lengths, " .....dis 20 %
" Billet Webs, 30 in. " .....dis 25 %
" Lightning Buck Saws X Par.....dis 25 %
" Lightning Hand, Panel and Rip.....dis 25 %
Wheeler & Clemson Mfg. Co.'s Hand.....dis 20 %
W. M. & C. Mfg. Co. Cross-Cuts, except Monarch, dis 20 %
Livingston's Butcher and Kitchen.....dis 20 %
Framed Wood—
Nos.... 101 102 103 104 105
Per doz..$10.00 8.40 10.00 7.50 6.25 net

Saw Frames.
White, Vermont.....₩ doz $1.35, dis 25 %
Red, Polished and Varnished.....₩ doz $2.00, dis 25 %
Saw Rods.....$10 list dis, 10&10 %

Saw Sets.
Boynton's Patent X Cut, per doz. $12.00; Hand Saw, per doz.. $10.00.....dis 20 %
Stillman's Genuine.....₩ doz $3.50@$5.50 dis 10 %
" Imitation.....₩ doz $2.25. dis 30&10 %
Common Lever.....per doz $2.00, dis 30&10 %
Leach's.....No. 0, $8.00; No. 1, $15.00. dis 15 %
Nash's.....No. 1, $8.50; No. 2, $7.50, dis 20 %
Hammer, Hotchkiss.....$7.50, dis 10 %
" Bemis & Call Co.'s New Pat.....dis 40&5 %
Bemis & Call Co.'s Lever & Spring Hammer..dis 50&5 %
" " Plate.....dis 10 %
" " Cross Cut.....dis 12½ %
Aiken's Genuine..... .....$13.00. dis 50&10 %
" Imitation..... .. ..$7.00. dis 50 %
Hart's Patent Lever.....dis 20 %
Disston's.....dis 20 %

Scales.
Hatch, Counter, No. 171.....₩ doz $36, dis 35&10 %
" Tea, No. 161.....₩ doz $12.00 dis 40&10 %
Union Platform.....$6.00. dis 45 %
Fairbanks'..... .. .. dis 20 %
Buffalo Scle Co.....dis 20&5 %
Howe's..... .. .. dis 20&5 %
Chatillon's Grocers'.....dis 45 %
" Eureka.....dis 20 %
Family Universal.....dis 50 %
" Favorite .....dis 30 %
" Turnbull's.....dis 30 %
Scale Beams, Chatillon's list.....dis 10 %
" Sargent's list.....dis 40&10 %

Scrapers.
Adjustable Box Scraper (S. R. & L. Co.), $6.50.dis 20&10 %
Box, 1 Handle.....₩ doz $4.00, dis 10 %
" 2 " .....₩ doz 6.00 dis 10 %
Defiance Box and Ship.....dis 20&10 %
Foot.....dis 20&10 %
Ship (common).....per doz $3.00 net
" (Providence Tool Co.....dis 10 %

Screw Drivers.
Douglass Mfg. Co.....dis 20&10&10 %
Disston's.....dis 50 %
Disston's Patent Excelsior.....dis 50 %
Buck Bros.....dis 25 %
Stanley Rule & Level Cos., Varnished Hdls..dis 50&10 %
" " " Black Handles...dis 40&10 %
Sargent & Co.'s.....dis 50&10 %
Gay's Double Action Ratchet per doz., 4 in., $9.00; 5 in., $10.20; 6 in., $12.00 dis 30 %
Cowles Hdw. Co., No. 1 Extra.....dis 40&10 %
" " No. 1.....dis 50&10 %
" " Nos. 4 and 00.....dis 30 %

Screws.
Flat H'd Iron.....dis 45 %
Round Head Iron.....dis 40 %
Flat Head Brass.....dis 45 %
Round Head Brass.....dis 30 %
Brass and Silver Capped.....dis 40 %
Japanned, list of Plain Screws.....dis 30&10 %
Coach Patent Gimlet Point, List per 100....dis 50@55 %
Bed.....dis 10 %
Machine, Flat Head, Iron, Am. Screw Co.....dis 60 %
" Round Head, Iron, " .....dis 55 %
Bench, Iron.....dis 55 %
" Wood, Beech .....₩ doz $3.00, dis 10 %
" Hickory.....dis 20&10 %
Hand.....dis 20&10 %
Hand Rail, Sargent's.....dis 50&10&10 %
" " Humason, Beckley & Co's .....dis 50 %
" " Am. Screw Co... .....dis 35 %
Jack (Wilson's).....dis 20 %

Screw Window Balances.
R. B. Hugunin's.....$36.00 per gross, dis 25&10&5 %

Scroll Saws.
Lester, $10.00.....dis 20 %
Rogers, $3.50.....dis 25 %

Shears and Scissors.
American (Cast) Iron.....dis 60&10 %
Clipper Cast Iron.....dis 70&10 %
Pruning.....see Pruning Hooks and Shears.
Barnard's Lamp Trimmers.....₩ doz $5.75
Tinners'.....dis 15 %
Seymour's, List, Nov. 25, 1879.....dis 60 %
Heinsch's " " .....dis 60 %
" Tailors' Shears.....dis 33⅓ %
Mass. Cutlery Co. St. Trimmers.....dis 75 %

Sheaves.
Sliding Door, M. W. & Co., list.....dis 50&2 %
" R. & E. list.....dis 60&10&2 %
" Patent Roller.....dis 10 %
" " " Hatfield's ...dis 60&10&2 %
" Russell's Anti-Friction ....dis 60&10&2 %
" Moore's Anti-Friction.....dis 40 %
Sliding Shutter, R. & E. list.....dis 60&10 %2 %
" " Sargent's list.....dis 55&10 %
Moore's Anti-Friction (Hanging).....dis 40 %

Shovels and Spades.
Ames. New list. Jan. 20. 1880.....dis 10 %
Russey Binns & Co., Patent.....dis 15 %
" Association List.....dis 5 %
Old Colony (changes in list Oct. 15, '79).....dis 15 %
Remington's (Lowman's Patent).....dis 25 %
Newland's.....dis 40 %
Griffiths.....dis 40&10 %

Shovels and Tongs.
Iron and Brass Head, R. & E. list.....dis 60&10&2 %
Polished Steel .....new list. dis 60&10&2 %

Slates.
Square Frames.....by case.....dis 70 %
Less than a case.....dis 65&10 %

Spoke Shaves.
Defiance Metallic.....dis 20&10 %
Iron.....dis 35 %
Wood.....dis 30 %
Bailey's (Stanley R. & L. Co.) new list.....dis 20&10 %
Stearns'.....dis 10&10 %

Spoke Trimmers.
Bonney's.....₩ doz $10.00 dis 40&5 %
Stearn's.....₩ doz $10.00, dis 40 %
Ives'.....No. 1, $15.00; No. 2, $12.00 ₩ doz, dis 50&10 %
Douglass'.....₩ doz $9.00, dis 15 %

Spoons.
Basting.....dis 55 %
Riveted Table and Tea.....dis 55 %
Solid Table and Tea.....dis 55 %
Britannia.....dis 60 %
The Wm. Rogers Mfg. Co.....dis 33⅓&2 %
Reed & Barton.....dis 33⅓&2 %
Hall & Elton.....dis 33⅓&2 %
Holmes, Booth & Haydens.....dis 33⅓&2 %
German Silver.....dis 25&10 %
Cast Steel, Sil. Plated.....dis 33⅓ %
Tin (P. S. & W.), Teas.....$1.25 ₩ gross, net
" " Tables.....$2.00 ₩ gross, net
Tin Cowles Hdw. Co.).....dis 10 %
" " " case lots.....dis 20 %

Stocks and Dies......dis 55&10 %
"Lightning" Screw Plate.....dis. 10 %

Stone.
Hindostan Hacker Stone.....₩ gross $12.00 dis 10 %
Sand Stone.....₩ lb 6c. dis 33⅓&10 %
Washita Stone.....No 1. ₩ lb 18c net
" .....No 2. ₩ lb 15c net
" Slips.....No. 1. ₩ lb 36c net
Washita Stone (Boyd & Chase).....No. 1 ₩ lb 15c net
" " Slips (Boyd & Chase).....30c net
" " mo'tea (Boyd & Chase) 0, 7 & 8 in, dis 30 %
" " No. 2.....₩ lb, 13c, net
Arkansas Stone No. 1, 4 to 6 in.....₩ lb $1.35 net.
" " No 1, 6 to 9 in .....₩ lb $2.00 net
Turkey Oil Stone (Boyd & Chase)....4 to 8in, $1.00 ₩ lb, dis 10 %
" Slips .....$2.40 ₩ lb, dis 10 %
Lake Superior (Boyd & Chase).....₩ lb 20c, dis 10&5 %
" " Slips " .....₩ lb 45c, dis 10&5 %
Grindstones. Family, Loring's.....dis 10 %

Stove Polish.
Joseph Dixon's.....₩ gross $5.75 net
Gem.....₩ gross $4.50, dis 10 %
Gold Medal.....₩ gross $6.00, dis 25 %
"Mirror".....₩ gross $6.00, dis 5 %
Ruby.....₩ gross $5.75, net
Rising Sun.....₩ gross $5.75, net
Dixon's Plumbago.....₩ lb 8c. net

Squares.
Steel.....dis 50 %; full cases, dis 50&10 % } 2 %
Iron.....dis 50 %; full cases, dis 50&10 % } cash
Nickel Plated.....add $2.50 @ $4.00 ₩ doz, net }
Try Squares and T Bevels.....dis 45&10 %
Disston's Try Squares and T Bevels.....dis 53⅓ %
Winterbottom's Try and Mitre.....dis 20&10 %

Tacks, Brads, &c.
List of April 2, 1880
Tinned Swedes Tacks.....dis 35 %
Tinned American " .....dis 45 %
Swedes Tacks, all kinds.....dis 20 %
Copper Tacks and Nails.....dis 25 %
Swedes Hungarian Nails .....dis 20 %
American " .....dis 20 %
Gimp and Lace Tacks.....dis 20 %
Finishing Nails.....dis 15 %
Trunk and Clout Nails.....dis 15 %
Common and Patent Brads.....dis 10 %
Basket Nails .....dis 15 %
Brush Tacks.....dis 10 %
Leathered Carpet Tacks.....dis 20 %
American Cut Tacks.....dis 20 %
Cigar Box Nails.....dis 20 %
Chair Nails.....dis 20 %
All other Tack List goods.....dis 20 %
Double-Pointed Tacks .....dis 40&5 %
Extra 10 % on all.

Tap Borers.
Common and Ring.....dis 15 %
Ives' Tap Borers.....dis 15&10 %
Enterprise Mfg. Co.....dis 20 %

Tapes, Measuring.
American.....dis 20 %
Spring Tapes.....dis 25&10 %

Thermometers.
Tin Case .....dis 65&10 %

Tobacco Cutters.
Enterprise Mfg. Co. (Champion).....dis 20 %
Wood Bottom.....₩ doz $12.00, dis 40&5 %
All Iron.....₩ doz $9.50, dis 40&5 %
Nashua Lock Co.'s.....₩ doz $18.00, dis 50@55 %

Toe Calks.—Winsted.....₩ lb 9c. dis 5

Tinners' Tools and Machines.
Machines (P. S. & W.).....list add 20 %
Tools (P. S. & W.).....add 6 %

Transom Lifters.
Wollensak's Patent.....dis 20 %

Traps.
Game. Newhouse.....dis 30 %
" Newhouse Pattern.....dis 50 @ 55 %
" Blake's Patent.....dis 40 %
Mouse, Wood, Choker.....₩ doz Boles, 10&40
" Round Wire.....₩ doz $1.50, dis 10 %
" Cage " .....₩ doz $2.50. dis 10 %
" Catch-em-alive.....₩ doz $2.50, dis 10 %
Rat. "Decoy".....per doz $10.00, dis 10 %

Trowels.
Lothrops Brick and Plastering.....dis 20 %
Reed's Brick and Plastering.....dis 15 %
Disston's Brick and Plastering.....dis 20 %
Peace's Plastering.....dis 30 %
Clement & Maynard's.....dis 20 %
Rose's Brick.....dis 15 %
Brades' Brick.....dis 20 %
Worrall's Brick and Plastering.....dis 20 %
Garden.....dis 45 %

Triers.
Butter and Cheese.....dis 25%

Vises.
Solid Box.....List of July 1, '79 dis 25 %
" "Crown" (A. H. Hildick) 40 to 100 lb, 15c net
" Peter Wrights.....15½c
Parallel, Parker's.....dis 10 %
" Wilson's.....dis 40 %
" Howard's.....dis 20&10 %
" Merrill's.....dis 15 %
" Sargent's.....dis 55&10 %
" Trenton.....dis 30 %
" Backus and Union.....dis 40 %
" Oval Slide.....dis 40 %
" Fisher & Norris.....dis 15&10 %
" Prentiss.....dis 25 %
" Stevens'.....dis 20 %
" Simpson's Adjustable.....dis 25 %
"Family." List.....net
Saw Filers, Bonney's.....₩ doz $24.00, dis 20&10 %
" Stearn's.....dis 20&10 %
" Hopkins'.....₩ doz $17.50 dis 10 %
Lowell Hand Vises.....dis 20 %
Richardson's Vise and Anvil.....dis 25 %

Washer Cutters.
Smith's Patent .....₩ doz $12.00 dis 25 %
Johnson's.....₩ doz $12.00. dis 33⅓ %
Penny's.....₩ doz $14.00 and $16.00. dis 45 %
Appleton's.....₩ doz $16.00, dis 62&10 %

Washers.—See Nuts and Washers.

Well Wheels.—Revised list.....dis 60&10%

Wire.
Brass and Copper..... List of June 10. 1880....dis 20 %
Bright and Annealed..... Nos. 0 @ 18. dis45 @ 20 %
" " ....Nos. 19 @ 26, dis 52½ @ 47½ %
....Nos. 27 @ 36.dis 60 @ 65 %
Coppered.....Nos. 0 @ 18.dis 40 @ 45 %
Galvanized, Nos. 0 to 6.....₩ lb 10c. dis 35 @ 37½ %
" Nos. 7 to 18.....market list. dis 35 @ 37½ %
Tinned, Nos. 0 to 18.....dis 37½ @ 42½ %
Cast Steel.....dis 25 @ 30 %
Tinned Broom Wire, Nos. 18 to 24.....dis 47½ @ 50 %
Annealed Fence, 7's, 8 and 9 .....dis 45 @ 50 %
" Grape, Nos. 10 to 14. .....dis 45 @47½ %
Galvanized Telegraph, Nos. 7 to 9 .....₩ lb 9c
" " Nos. 10 and 11.....₩ lb 10c
" No. 12 .....₩ lb 10½c
Fence Staples.....₩ lb 7½@ 7½c
" Staples, Galvanized.....₩ lb 8¼ @ 8½c
Stubs Steel Wire.....$7.00 to 8
Japanned Barb Fence.....₩ lb 9c
Galvanized " .....₩ lb 10c
Steel Music Wire, Nos. 12 to 27.....₩ lb. $1.25, net
Turner & Seymour Mfg. Co., Picture Wire..dis 80&20 %
Judd's Picture Wire.....dis 80&20 %
Clothes Line Wire, Galvanized.....₩ coil 30@400 net
Wire Cloth, greenand drab.....₩ sq. ft, 3½ c net

Wrenches.
American Adjustable.....dis 45 %
Baxter's Adjustable "S".....list Jan., 1880. dis 20 %
" Diagonal.....dis 20%
Coes 'Genuine.....dis 5 %
" "Mechanics".....dis 50&10 %
" Pattern, Malleable.....dis 70 %
Girard Standard.....dis 50&10 %
Girard Agl. .....6c&10 %
Bemis & Call's Patent Combination.....dis 20 %
" " Merrick's Pattern.....dis 35 %
" " Briggs' Pattern.....dis 35 %
" Cylinder or Gas Pipe.....dis 40 %
Van Wagoner & Williams' Basin .....per doz $4.50
Aiken Pocket (Bright).....$6.00. dis 60&10 %
The Favorite Pocket (bright).....per doz $6, dis 60 %
Webster's Pat. Combination.....dis 35 %

Wringers. Per doz.
Universal, XX No. 2½.....$50.00
" " No. 2 .....63.00
" " No. 1½ 71.00
" " No. 1.....93.00
" " No. 8.....each, 12.00
" " No. 12..... " 20.00
" " No. 18..... " 25.00
" " No. 22..... " 32.00
Peerless, No. 0, no Cogs.....51.00
" No. 1½ " 54.00
" No. 2½, with Cogs.....63.00
" No. 2, " 63.00
" No. 3, " 71.00
" No. 4, " 89.00
Unique, No. 0.....57.00
" No. 1.....54.00
Eureka, No. 1.....54.00
Novelty, No. 10, with Cog Wheels.....60.00
" No. 2, " 63.00
Excelsior, No. A, with Folding Bench.....75.00
" No. E, for Set Tubs.....89.00

NEW YORK WHOLESALE PRICES, November 10, 1880.

METALS.

IRON.—DUTY: Bars, 1 to 1½c. ₩ lb; Sheet, Band Hoop and Scroll, 1¼ to 1¾c. ₩ lb; provided, that none of the above Iron shall pay a less rate of duty than 35 per cent. Pig, $7 ₩ ton; Polished Sheet, 3c. ₩ lb; Wrought Scrap, $8 ₩ ton; Cast Scrap, $6 per ton. Railroad 70c. ₩ 100 lbs. Boiler and Plate, 1½c. ₩ lb.

Iron—AMERICAN		
Foundry No. 1	₩ ton	$25.00 @ 26.00
" No. 2X	₩ ton	21.00
Gray Forge	₩ ton	20.00
SCOTCH.		
Eglinton	₩ ton	21.50 @ 22.00
Coltness	₩ ton	24.50 @ 25.00
Glengarnock	₩ ton	23.50 @ 24.00
Gartsherrie	₩ ton	23.50
Rails.		
Iron	₩ ton	$46.00 @ 48.00
Steel	₩ ton	59.00 @ 63.00
Old Rails	₩ ton	27.00 @ 28.00
Scrap.		
Wrought Scrap ₩ ton		26.00 @ 27.00

Bar Iron, from Store.—

Common Iron:		
¾ to 2 in. round and square / 1 to 6 in. x ¾ to 1 in.	₩ lb	2.20
Refined Iron		
¾ to 2 in. round and square / 1 to 6 in. x ¾ to 1 in.	₩ lb	2.40
1 to 6 in. x ¼ and ⅝ in.	₩ lb	2.60
Rods—¾ and 11-16 round and square	₩ lb	3.10
Bands—1 to 6 x 3-16 to No. 12	₩ lb	3.10
Norway Nail Rods		7. c

Sheet Iron.

	Common American	R. G. American.
Nos. 10 to 20	₩ lb 3¾	5
21 to 24	₩ lb 4	5
25 to 26	₩ lb 4⅛c	5¼
27	₩ lb 4⅛c	5¼
28	₩ lb 4¾c	5¾

	B.B.	3d qual.
Galvanized, 10 to 20	₩ lb 8c	7c
21 to 24	₩ lb 9c	8c
25 to 26	₩ lb 9½c	8½c
" 27	₩ lb 10½c	9c
" 28	₩ lb 11c	9½c

Patent Planished ₩ lb 12c; B, 10½c
Russia 12@13 c
American Cold Rolled ₩ lb 5 @7½c

COPPER.—DUTY: Pig, Bar and Ingot, 1c; Old Copper 4c ₩ lb; Manufactured (including all article of which Copper is a component of chief value), 45 % ad valorem.

American Ingot ₩ lb See Trade Report.

SHEATHING, BRAZIERS' COPPER, BOLTS, &c.

Braziers' Copper, ordinary sizes, 16oz. per sq. ft., and over per lb	28c
Braziers' Copper, ordinary sizes, under 16 oz. and over 12 oz. ₩ sq. ft.	₩ lb 30c
Braziers Copper 10 oz and 12 oz., ₩ sq. ft.	₩ lb 32c
" Lighter than 10 oz. ₩ sq. ft	₩ lb 34c
Circles less than 24 in. in diameter	₩ lb 31c
Circles 24 in. diameter and over	₩ lb 34c
Segment and Pattern Sheets	₩ lb 31c
Locomotive Fire Box Sheets	₩ lb 28c
Sheathing Copper, over 12 oz. ₩ sq. ft.	₩ lb 26c
Bolt Copper	₩ lb 28c
Copper Bottoms	₩ lb 31c

No Copper in Sheathing except 14x48 inches and not to exceed 34 oz. to the sq. ft.

TINNING.

14x48	₩ sheet 60

All other size Sheets, 2½c. per square foot.
For tinning both sides, double the above amount.
O'NEILL'S PATENT FLANGED COPPER.—Net.

1 X 48.		
4 and 32 oz. and heavier	₩ lb 36c	By the case. ₩ lb 34c
12 oz. and lighter	₩ lb 39c	" " ₩ lb 38c

Boiler Sizes.

7 in., 14x42. 8 in., 14x48. 9 in., 14x60.
24 and 16 oz. and heavier. ₩ lb 38c By the case. ₩ lb 37c
(And all sizes not over 20 in. wide.)

30 IN.	
4 and 16 oz. and heavier	₩ lb 40c
12 oz.	₩ lb 43c

Brass.

Brown & Sharp's Gauge the Standard for Metal; Old English Gauge the Standard for Wire.

BRASS MANUFACTURERS' PRICE LIST.—dis 20%.
June 10, 1880.

Cash prices for Roll and Sheet Brass. For less quantity than 100 lbs. add 3c ₩ lb.

HIGH BRASS.

All Nos. not thinner than to No. 28, wider than 2 in., not wider than 14 in. 30c
All Nos. to No. 28, inclusive, and widths over 14 to 20 in., inclusive 34c
All Nos. to No. 28, inclusive, and widths over 20 to 30 in., inclusive 38c
3c ₩ lb advance on each No. above Nos. 28 to 38, inclusive.
All Brass thinner than No. 38 is Platers' Brass, at 43c
Sheets 24x48, and all sheets cut to particular sizes and lengths under 30 in., in width wider than 2 in. 37c
Platers' Rules 45c
Sheets wider than 30 in. and under 40 in. 47c
" 40 in. and over 50c
Circular Sheets, in diam. from 4 in. to 14, inclusive 30c
" " over 14 " 20, " 45c
" " " 20 " 30, " 49c
" " " 30 " 40, " 45c
" " " 40 in. 50c

LOW BRASS.

4c ₩ lb more than High Brass.
Gilding Metal, 8c ₩ lb more than High Brass.
Platers' or Gold Metal { In Bars 43c; Sawed 51c; Planed or Polished 54c

FOR SLITTING.

Metal in width 2 in. to ¼ in. to No. 28, inclusive, 1c. ₩ lb advance.
Metal, in width 2 in to 1 in., thinner than No. 28, 2c. ₩ lb advance.
Metal, in width 1 in. to ¼ hinner than No. 28, 3c ₩ lb advance
Metal, in width ¼ in. to ⅛, inclusive, not thinner than No 28, 2c. ₩ lb advance.
Metal, in width ⅛ in. to ¼ thinner than No. 28, 5c. ₩ lb advance.
Metal, ¼ in. in width and less, 10c. ₩ lb advance.
Any of the above widths cut to particular lengths, add 7c. ₩ lb.

GERMAN SILVER MARKET METAL AND WIRE.

	Market Metal.	Wire.
4 per cent., 12 inch, to No. 26	$0.42	$0.70
6 " " "	.56	.76
10 " " "	.64	.88
12 " " "	.74	1.03
13 " " "	.80	1.12

German Silver Sheets over 12in. wide and weighing more than 10 lbs., $2.00 ₩ lb.
Advance 2c. for each additional inch in width above 12 in., and 2c. ₩ lb on each No. thinner than Nos. 26 to 46, inclusive
All German Silver thinner than No. 36 is Platers, at 50c ₩ lb additional.
German Silver Scrap one-half less than net price of 12 in Market Metal. German Silver Turnings, Filings and Chips, half the price of Scrap.

BRASS AND COPPER WIRE.	High Brass.	Low Brass.	Gild'g and Copper.
No. 0 to 20	$0.34	$0.37	$0.43
No. 21	.36	.40	.46
No. 22	.37	.41	.47
No. 23	.38	.42	.48
No. 24	.40	.44	.50
No. 25	.43	.47	.54
No. 26	.45	.49	.55
No. 27	.48	.52	.58
No. 28	.52	.56	.63
No. 29	.55	.59	.66
No. 30	.58	.63	.72
No. 31	.62	.66	.78
No. 32	.66	.70	.84
No. 33	.70	.74	.93
No 34	.74	.78	1.03

Spring Wire 2c ₩ lb advance.
Flat, Square and Half Round Wire 4c ₩ lb advance on Round Wire.
Fancy Wire not less than 10c ₩ lb advance of Round Wire.
Brass Rods, No. 8 and larger, not less than 2 feet lengths, 38c.
Wire straightened and cut, smaller than No. 8, and not less than 2 feet lengths, 43c.
Wire and Rods less than 2 feet lengths, special rates.
Twelve cents per lb extra for spooling on 1 lb spools

MISCELLANEOUS.

Brass Pail Ears	$0.60
Brass Door Rail	.43

SCRAP.—dis. 20 %

High Brass Scrap	12c
Yellow "	14c
Gilding "	16c

Turnings, Filings and Chips half the price of Scrap.
Terms—Net cash. Interest to be added after thirty days.

TUBING.—dis 20 %

Plain No. 2 inclusive above ¼ in. to 3 in.	$0.43
" above 3 in.	.53

Nos. 21, 22, 23, two cents advance on List for each Number.
Nos. 24, 25, 26, four cents advance on List for each Number.
Above No. 26, special rates.

Plain, ¼ inch	.70
" 3-16 "	1.10
" ⅛ "	1.60

All Mandrel Drawn Tubes, 5 cents advance on List prices.
Fancy Tubing to No 20 50c
English, Scotch and Extra Patterns Fancy Tubing to No. 20 .55
Fancy Sawed or Cut 2 to 4 feet long, 2 cents advance on List.
Cut to 2 cents ½ cent for each additional cutting under 2 feet.
All Mandrel Drawn Tubes under ⅜ in. 25 cents per pound advance.

RING TUBING.—dis 20 %.

Plain	.27
Fancy	.33
English and Extra Patterns	.36

GERMAN SILVER TUBING.—dis 10 %

4 Per cent.	.80
6 "	.90
9 "	1.05
12 "	1.20
15 "	1.35
16 "	1.40
18 "	1.50
20 "	1.60

STEEL.—DUTY: Bars, Ingots, Sheets and Coils valued at 7 cents ₩ lb., or under, 2¼ cents; over, 7 cents, and not above 11, 3 cents ₩ lb; over 11, 3½ cents ₩ lb, and 10 % ad val. Railway Bars, 1¼ cents ₩ lb. Railway Bars, in part Steel, 1 cent ₩ lb. Provided, that Metal cemented, cast or made from Iron by the Bessemer or pneumatic process, of whatever form or description, shall be classed as

American Cast Steel.

For American Steel see quotations under heading of Pittsburgh.

English Steel,—	
" Best Cast	₩ lb 15½c
" Extra Cast	₩ lb 16½c
" Round Machinery, Cast	₩ lb 10c
" Swaged, Cast	₩ lb 18c
" Best Double Shear	₩ lb 15½c
" Blister, 1st quality	₩ lb 13c
German Steel, Best	₩ lb 11c
" 2d quality	₩ lb 10c
" 3d quality	₩ lb 9c
Sheet Cast Steel, 1st quality	₩ lb 13½c
" 2d quality	₩ lb 12½c
" 3d quality	₩ lb 12c
ANTIMONY	See Trade Report

LEAD.—DUTY Pig $2 ₩ 100 lbs; old Lead, 1½c ₩ lb. Pipe and Sheet, 2½c ₩ lb.

American	5½ @ 5½c
Bar	6c net
Pipe	6½c dis 10 %
Tin Lined Pipe	14c. dis 10 %
Sheet	7c. dis 10 %
Shot	Drop 7½c, Buck. 8½c
Chilled Shot	8½c

RABBITT METAL.

N. P. U	₩ lb 7½ @ 80

A. 24c; B, 20c; C, 15c.

TIN.—DUTY: Plates, Sheets, Tagger and Terne, 1.1c ₩ lb; Electro-galvanized Plates, 2c ₩ lb; Manufactures of, not enumerated, 35 per cent. ad. val. Bars, Block and Pigs free. Banca, subject to duty of 10 per cent

Banca	23 ₩ lb 25 @ 26c
Straits	₩ lb 22c
English	₩ lb 21 @ 22c

TIN PLATES.

I C 10x14 / 14x20	Prime Charcoal	$6.50
I C 12x12	"	6.75
I X 10x14 / 14x20	Charcoal	8.50
I X 12x12	" "	8.75
D C 12½x17		6.00
D X 12½x17		8.00
For each additional X add		2.00

COKE TIN PLATE.

	Best.	Ordinary.
I C 10x14 }	$6.00	5.00 @ 5.75
I C 14x20 }		
I C 12x12	6.25	5.50 @ 5.75

TERNE PLATE

	Prime Char.	2d qual.	Coke.
I C 14x20	$ 5.75	5.50	5.25
I X 14x20	7.75	....	....
I C 20x28	12.00	11.50	11.00
I X 20x28	15.00	....	....
I C 20x30	23.00	....	....
I C 14x20 M. F. Brand			8.00

SOLDER	No. 1, 12c @ 13 c; No 2, 11c
SPELTER—DUTY: in Pigs, Bars and Plates, $1.50 ₩ 100 lbs.	
American, cash	5½ c
Bergen Port from Lehigh Ore	10c
Lehigh, on spot	9c

ZINC.—DUTY: Pig or Block, 1.5c ₩ 100 lbs. Sheet 2½c ₩ lb.

Sheet, Cask	7¼ @ 7¾
" Open	7¼ @ 8

Paper Stock, &c.

(Dealer's Selling Price.)

Canvas linen	4 @
White cotton, new	4½ @
" " No. 2	3½@
White linen rags No. 1	5 @
" " No. 2	2½ @
Seconds	2¼ @
Soft woolens	12 @ 1
Gunny bagging	3¾ @
Jute Butts	3 @ 3½
Kentucky bagging	4½@
Waste paper and scraps	1 @ 1¼
Rope cuttings	1½ @ 3
Kentucky bale rope	4 @ 4½
Grass rope	3¼ @ 3½
Tarred shaking	1¾ @
Hard White Shavings, No. 1	4½ @ 4¾
Soft " No. 1	4 @ 4½
White Shavings, No. 2	3¼ @
Mixed " part white	3½ @
Imperfections, No. 2, best folded sheets	3¼ @ 3½
" No. 1, Heavy Stock	3¼ @
Book Stock	3 @
" " Heavy	3 ¼ @ 3½
" " Light	1½ @ 1¾
Newspapers	2 ½ @ 2¾
Prints	1¾ @
Pure Manilas	2¼ @ 3
Bogus Manilas and Hardwares	$1.25 @ 1.40
Commons	.90 @ 1.00
Binders' Board Cuttings	1.00 @ 1.25
Straw board Cuttings, clean	1.00
Woolen Tailor Clips	18 @ 19
Satinet	2½ @ 3½

Paints, Oils, &c.

Paints.

Black Lamp, Coach Painters	₩ lb 20c
" " Ordinary	8c
" Ivory Drop, fair	12 @ 14c
" " best	21c
Black Paint, in oil	kegs 8c asst'd cans, 11c
Blue Prussian, fair to best	40 @ 45c
" " in oil	45 @ 55c
Blue Chinese dry	8c
" Ultramarine	25 @ 30c
Brown, Spanish	1½c
" Van Dyke	10@12c
Carmine, 40	combination price
Green, Chrome	15 @ 23c
" in oil	14 @ 18 @ 24c
" Paris	good 24c; best, 30c
" " in oil	30c; 45c
Iron Paint, Bright Red	₩ lb 2½c
" Brown	₩ lb 1½c
" Purple	₩ lb 3c
" Ground in Oil, Bright Red	₩ lb 5½c
" " " Red	₩ lb 5c
" " " Brown	₩ lb 4½c
" " " Purple	₩ lb 5c
Mineral Paints	1½ @ 4c
Orange Mineral	19c
Red Lead, American	7½c
" " English	none in market
" Venetian (N. C.) dry	$1.65 @ $1.70
" in oil	asst'd cans, 11c; kegs, 8c
" Indian dry	9 @ 12c
Rose Pink	10 @ 13c
Sienna, American, Raw	4c
" Burnt	4½c
" in oil	15 @ 16 @ 20c
" Raw	11 @ 14 @ 25c
Umber, Burnt	4 @ 5c
" " in oil	9 @ 12 @ 16c
" Raw	3½ @ 7½c
" " in oil	10 @ 16 @ 18c
Vermillion, Chinese	0.0
" English	55 @ 57½c
" Trieste	1.10c
" American, Common	15c
White Lead, American, pure dry	8c
" " " in oil	8½ to 9c
White, Paris, English, prime	in bbls. 2 @ 2½c
Yellow Ochre, French	$1.75
" " " in oil	asst'd cans, 11c; kegs, 8c
" " Vermont	in casks, 1½c
Yellow Chrome	17 @ 27c
" " in oil	14 @ 18 @ 25c
Zinc White American No. 1, dry	5 @ 5½
" " No. 1, in oil	9c
" French (Paris)	8 @ 10c
" " in oil	@ 10c

Oils.

Linseed, Raw, in casks and bbls	gal. 58c
" Boiled, " "	61c
Bleached Whale	₩ gal. 65c
" Sperm	₩ gal. $1.18
" Elephant	57c
Signal	60c
Prime Lard	68c
No. 1	53c
West Virginia	17c @ 24c
Drilling	40c
Empire Cylinder	55c
Miners' Oil	35 to 45c
Fish Oil, pressed	44c
Neatsfoot	75c
Tallow	9½c
Machinery	40c
Engine	30c

Sundries.

Asphaltum	9c
Benzine	₩ gal 10c
Chalk	3½c
" Block	5½c
Dryer, Patent, Am'n ass't cans, 10½c; kegs, 9c	
Frostings	50c
Glue, White	33 @ 44c
" Sheet	20c
Glaziers' Points, Zinc	8c
Gum, Copal	30c
" Damar	24c
" Shellac, English	40c
" " dark	42c
Litharge, English	7½c
Mineral Wool	₩ lb 1¼ @ 1½c
Pumic Stone, selected Lumps	4 @ 6c
" powdered	3½c
Putty, in bladders	3 c
" in bulk	2½c
Spirits Turpentine	42c
Whiting Spanish	80c

Glass.

FRENCH WINDOW GLASS.

Prices current per box of 50 feet.

Single Thick.—Discount 45 to 50 %.

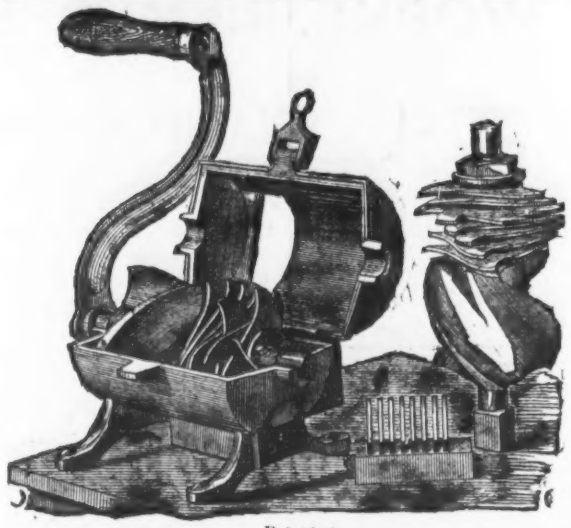
SIZES.	1st.	2d.	3d.	4th.
6 x 8 to 10 x 15	$ 6.50	$ 5.75	$ 5.50	$ 5.25
11 x 14 to 16 x 24	7.25	6.75	6.25	6.00
18 x 22 to 20 x 30	9.25	8.50	7.75	7.25
15 x 36 to 24 x 30	10.25	9.25	8.25	
26 x 28 to 24 x 36	11.00	10.00	9.00	
26 x 36 to 26 x 44	11.75	10.75	9.50	
26 x 46 to 30 x 50	13.25	12.50	10.50	
30 x 52 to 30 x 54	14.00	13.00	11.25	
30 x 56 to 34 x 50	15.00	13.75	12.50	
34 x 58 to 34 x 60	15.50	15.00	13.25	
36 x 60 to 40 x 60	17.50	16.00	15.00	

Double Thick.—Discount 45 to 50 %.

SIZES.	1st.	2d.	3d.	4th.
6 x 8 to 10 x 15	$ 8.25	$ 7.75	$ 7.50	$ 7.00
11 x 14 to 16 x 24	10.00	9.25	8.75	8.25
18 x 22 to 20 x 30	12.75	11.75	10.75	
15 x 36 to 24 x 30	14.25	13.00	11.75	
26 x 28 to 24 x 36	15.25	13.75	12.50	
26 x 36 to 26 x 44	16.25	14.75	13.00	
26 x 46 to 30 x 60	17.50	16.75	14.25	
30 x 52 to 30 x 54	18.50	17.25	14.75	
30 x 56 to 34 x 58	19.50	18.25	16.25	
34 x 58 to 34 x 60	20.50	19.50	18.00	
36 x 60 to 40 x 60	23.00	21.00	20.00	

An additional 10 per cent. will be charged for all Glass more than 40 inches wide. Any size over 52 inches in length, and not making more than 81 united inches will be charged in the 81 united inches bracket.

KIESER'S MEAT CUTTERS



Patented.

Are offered as a first-class Cutter. The Knives are made from **Best Cast Steel.** The **Circular Knives** revolve **between a Comb** of **Permanent Knives** of **same gauge,** making a **Double Shearing Cut,** cutting **faster and finer** than any machine made. The arrangement of the Knives **expels all meats as cut.** Is an excellent **Spice Mill.**

Also, Manufacturers of

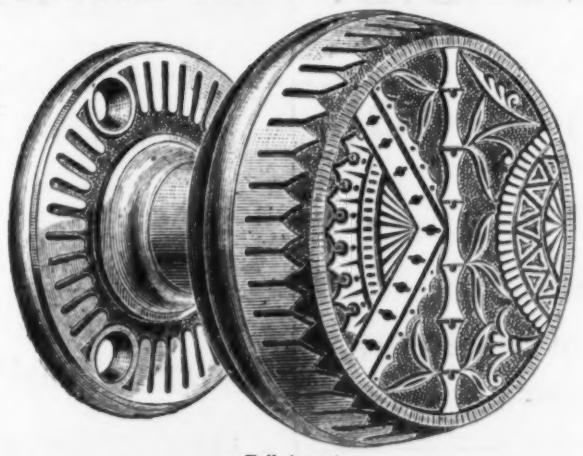
BOSS MOLASSES GATES,
KIMBALL'S PATENT SHOVELS,
LOCKWOOD'S PATENT HOES,

KIMBALL SHOVEL CO., Sole Manufacturers,

Office, 67 German Street, - BALTIMORE, MD., U. S. A.

BRANFORD LOCK WORKS,

ORIENTAL PATTERN KNOBS.



Full size cut.

We have issued, under date of June 10, a complete revised Price List, a copy of which, with our 1879 Illustrated Catalogue, will be furnished to the trade free on application. Said Catalogue contains illustrations and descriptions of over 1000 different varieties of Door Locks, Knobs and Escutcheons.

MANUFACTORY AND OFFICE,

BRANFORD, CONN., U. S. A.

PATENT
Elliptic Spring Whistles

FOR
SPEAKING TUBES.
Patented April 27th, 1879.

We call the attention of the trade to the whistle for speaking tubes, represented in above cut, as being superior, in a mechanical point of view, on account of the

PATENT ELLIPTIC SPRING,

which is much less liable to break and get out of order than the spiral spring usually used. These whistles being made entirely of metal, are very strong and durable. They are offered in a variety of styles at very reasonable prices. Send for illustrated circular and quotations.

We also invite an examination of our **PATENT REVERSIBLE DOOR LOCKS,** which by their peculiar construction, combine **simplicity, strength and durability.** In these Locks the combination of the Patent Lever and Spring renders the latch movement very easy and prompt in action.

Illustrated catalogues and price lists furnished on application.

TRENTON LOCK AND HARDWARE CO.,

Manufacturers of **Superior Building Hardware.** Trenton, N. J.

AGENTS.

JAMES M. VANCE & Co., 211 Market St., Philadelphia, Pa. : JAMES MARSHALL, 48 Warren St., New York.

R. J. ANDERSON, President. A. B. PARKER, Vice-Pres. JAS. A. VAN BRUNT, Sec'y & Treas.

NEW YORK WIRE AND WIRE ROPE CO.

Manufacturers of

WORKS:
South Brooklyn
AND
Mott Haven, N. Y.

WIRE ROPE

New York Office:
23 Astor House.

WIRE, FURNITURE SPRINGS & UMBRELLA FRAMES.

LAFLIN MFG. CO., Westfield, Mass,

Manufacturers of
PAT. IMPROVED STEAM HEATING APPARATUS

LAFLIN MFG. CO.'S
Pat. Single Iron Plane

Made of extra quality iron. A practical labor-saving tool. Cuts against the grain equally as well as with it. Can be adjusted instantly to cut a coarse or fine shaving, and excels any double iron plane ever produced.

PATENTS

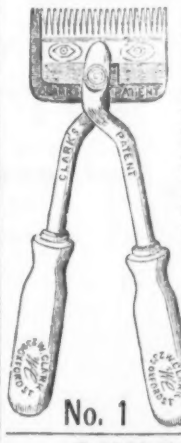
303 Euclid Ave., Cleveland, O. | TRACY, DYER & WILBER, Solicitors and Counsel in Patent Litigation | 519 Seventh St., Washington.

Send for "ALL ABOUT PATENTS," 140 Pages—Free.

CLARK'S PATENT

ENGLISH HORSE CLIPPERS.

Prize Medals Awarded, Paris, 1878. Grand Prize Awarded, Sydney, 1879.

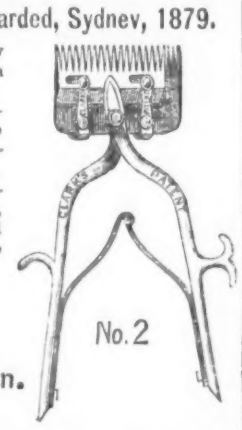


No. 1

No. 1. This well-known instrument has now been before the Public for 12 years, and has given universal satisfaction.

No. 2. One-handed Clipper for Heads. Extensively used by all Barbers, and has been before the Public for the last seven years. To be obtained wholesale, of Messrs. Moseman & Bro. 128 Chambers St., New York, Messrs. I. Hambleton & Son, 221 Spruce St., Philadelphia, Pa., and Messrs. Field, Luter & Co., Madison and Market Sts., Chicago, and all Merchants in the United States, and of the Patentee,

W. CLARK,
232 Oxford St., London.



No. 2

AGENTS WANTED.

AKRON IRON CO., Akron, Ohio,

SOLE MANUFACTUREPS OF PATENT

HOT POLISHED SHAFTING.

This Shafting commends itself to the trade generally as superior to any shafting ever before introduced to the market, for the following reasons, viz.:

1st.—It is perfectly straight and round.

2d.—It can be rolled accurately to any desired gauge.

3d.—It has the beautiful blue finish of Russia Sheet Iron, rendering it less liable to rust or tarnish than shafting of the ordinary finish.

4th.—It will not spring or warp in key seating, like most of the other manufactured shafting sold in the market, and, as a consequence, is admirably adapted for line and counter-shafting.

5th.—The surface is composed of magnetic oxide of iron, forming a superior journal or bearing surface.

6th.—It is made of superior stock.

Price lists, with references and other information, furnished on application to us,

AKRON IRON CO., Akron, Ohio,

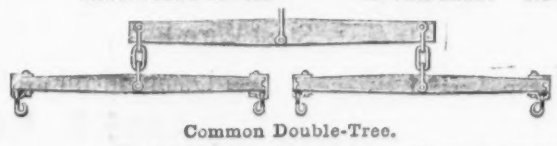
Or to our Agent, **E. P. BULLARD, 14 Dey St., New York City,** General Agent for New York City and other Eastern States.

IRON DUKE

Successful in a Competitive Test at Xenia and Dayton, over twelve and fourteen of the Leading Harrows.

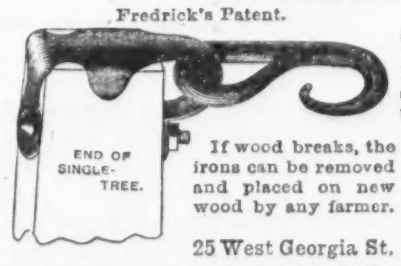
First Premium at the Ohio State Fair, over Forty-Four Competitors.

ADJUSTABLE TEETH. STRONG. ON THE ROAD. DURABLE. See it next week in the field.



Common Double-Tree.

Fredrick's Patent.



If wood breaks, the irons can be removed and placed on new wood by any farmer.

Write for Prices and Discounts.

We have a line of Equalizers, Double and Single-Trees that are Unsurpassed for Utility.

Manufactured Exclusively by

R. P. Kimberlin & Co.

25 West Georgia St. INDIANAPOLIS, IND.

THE BERTHA ZINC.

Mine and Works at Martin's Station, Virginia.

Equal to the Best Spelter known.

LUCIUS HART & CO., - - Sole Agents.

Nos. 8 & 10 Burling Slip New York.

COXE BROS. & CO.,

Cross Creek Lehigh Coal.

The Purity and Strength of this Coal especially adapt it for the working of Iron and Metals.

GENERAL OFFICE, Room 12 Trinity Building, 111 Broadway, New York.
BRANCH OFFICES, Chicago, Ill., 90 LaSalle Street. Philadelphia, 206 Walnut Place.

E. B. & S. W. ELY, Agents, P. O. Box 262, N. Y.

SABIN MFG. CO.,

MONTPELIER, VT., MANUFACTURERS OF

DOUBLE-ACTING SPRING BUTTS,

SABIN'S LEVER DOOR SPRINGS, For heavy doors,

BOSS AND CROWN SPRINGS, For light doors.

Send for Catalogue. Represented in New York by *DAVID HYMES & CO., 93 Church St.*

TO NICKEL PLATERS.

American Nickel Works,
Camden, N. J., Aug. 1, 1880.

ANODES.—I am now prepared to supply **PURE ROLLED NICKEL ANODES** in any quantity.

These superior Anodes wear away in the solution evenly and completely, like rolled silver or copper plates, thus avoiding the vexation and loss caused by the crumbling and breaking of cast Anodes. They plate very evenly and regularly.

Though necessarily higher in price per pound, they are so much thinner (usual thickness 3-32 inch) that to furnish a tank of any given size costs but about half as much as if furnished with cast Anodes.

Though perfectly protected by my patent for Malleable or Rolled Nickel Anodes of Jan. 6, 1880, as well as by Dr. Fleimann's patent for making nickel malleable (of which I am sole and exclusive American licensee),

I make no charge of royalty for the use of these Anodes,

which are quite free from any patent claim of any other parties for Nickel Anodes.

SOLUTION.—In order to meet the wants of those who prefer to make their own solutions, I now make **NICKEL OXIDE** of high purity and easily soluble in any acid. It is better for this purpose than metallic nickel or nickel carbonate.

I also make and offer for sale Cast Nickel Anodes and Nickel-Ammonia Sulphate. Pure Grain Nickel always on hand. Malleable Nickel Castings made to order.

All these articles, being made with the greatest care from the ores of my own nickel mine, can be depended upon as of the highest quality and greatest uniformity.

ROLLED NICKEL ANODES....$2.50 per lb.
NICKEL OXIDE ..... 1.50 "

JOSEPH WHARTON.
Post Office Address,
P. O. Box 2786, Philadelphia.

WESTON DYNAMO-ELECTRIC MACHINE

NICKEL.

The rapid increase in the use of Nickel-Plating owing to the introduction of the Weston Machine and the very low price of nickel material, enables us to give greatly reduced estimates for complete outfits.

We are furnishing outfits specially adapted for Stove Work, giving a pure white deposit on plain or mat surfaces.

Outfits complete, with Dynamo-Electric Machine Tanks, Anodes, Solution, &c., &c., $250.

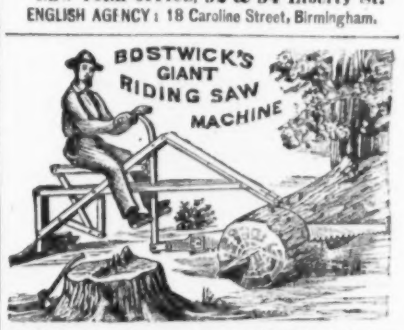
We beg to refer to the following Stove Manufacturers among 500 other houses using the Weston Machine: Richardson & Boynton, S. S. Jewett & Co., Fuller, Warren & Co., Perry & Co., Detroit Stove Works, Michigan Stove Co., Co-operative Stove Co., E. & C. Gurney, Hamilton & Toronto, and many others.

INFRINGEMENTS.

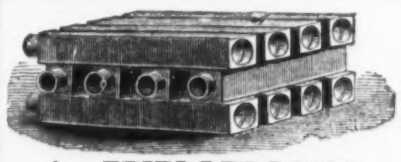
We call attention to infringements of the Weston Machine, in which Automatic Switches are used to prevent change of current. The Weston Co. are owners by grant or purchase of all forms of Automatic Switches for Plating Machines. The adoption of these machines will certainly lead to great loss to parties purchasing or using them.

CONDIT, HANSON & VAN WINKLE
Sole Agents NEWARK, N.J. U.S.A.

NEW YORK OFFICE, 92 & 94 Liberty St.
ENGLISH AGENCY: 18 Caroline Street, Birmingham.



The **Great Success** of the **Wonderful Improved Labor-saving BOSTWICK'S GIANT RIDING SAW MACHINE** is fully demonstrated by the large number in use and present demand. It saws logs of any size. One man can saw more logs or cord wood in one day, and easier, than two men can the old way. It will saw a 2 foot log in three minutes. Every farmer needs one. Township agents wanted. Send for illustrated circular and terms.
Address, FARMER'S MANUFACTURING CO.,
178 Elm Street, Cincinnati, Ohio.



A. WYCKOFF,

Manufacturer of

Wyckoff Patent Wood Water Pipe,

Steam Pipe Casing,

Chain Pump, Tube, Curbs, Reels, Rubber Valves, Chain, &c.

Established 1855. Send for pamphlet.

ELMIRA, N. Y.

THE BELMONTYLE OIL

PREVENTS RUST, TARNISH, &c.,

on Fire Arms, Machinery, Tools, Cutlery, Safes, Saws, Skates, Stoves, Hardware, &c., without injury to the polish. In use over 10 years. Highest testimonials. Samples, 50 cents; three for $1.00; sent free of expressage. Send for Circular.

BELMONTYLE OIL CO., Sole Manufacturers,
150 Front St., New York.

A. PARDEE, Hazelton, Pa. J. G. FELL, Phila.

A. PARDEE & CO.,

237 South Third St.,

PHILADELPHIA,

No. 111 Broadway, New York.

MINERS AND SHIPPERS OF

Lehigh Coals.

The following superior and well-known Lehigh Coals are mined by ourselves and firms connected with us, viz.

A. Pardee & Co. { HAZLETON, CRANBURY, SUGAR LOAF
Pardee, Bro. & Co. LATTIMER
Calvin Pardee & Co. HOLLYWOOD.
Pardee, Sons & Co. MT. PLEASANT.

Steel.

WOLFF, KAHN & CO.,

SUCCESSORS TO

R. H. WOLFF & CO.,

MANUFACTURERS, IMPORTERS, EXPORTERS & GENERAL MERCHANTS

MANUFACTURERS OF

CAST STEEL WIRE for all Purposes, Special Wire, Market Steel Wire, Prime Coppered Spring Wire, and of all Kinds of Furniture Springs, &c.

IMPORTERS OF

IRON & STEEL, WIRE RODS, GUN BARRELS, MOULDS & ORDNANCE.

EXPORTERS AND GENERAL MERCHANTS.

Direct all communications to

Works, Peekskill, N. Y. Office and Warehouse, 46 Cliff St., New York.

MILLER, METCALF & PARKIN,

Pittsburgh, Pa.,

Manufacturers of

CRESCENT STEEL,

In Bars, Sheets, Cold-Rolled Strips, &c.

Polished, Compressed Drill Rods and Wire.

Warranted equal to any imported in *quality, finish and accuracy.*

Also Common Grades.

Established 1810.

J. & RILEY CARR,

SHEFFIELD, ENGLAND.

Manufacturers of the "Celebrated

"DOG BRAND" FILES.

Also of Superior

STEEL

For Drills, Cold Chisels, Tools, Taps, Dies, &c.

COLD ROLLED STEEL for Clock Springs, Corsets, &c.

SHEET CAST STEEL for Springs, Saws, Welding and Stamping Cold, &c.

GERMAN, MACHINERY, ENGLISH AND SWEDES SPRING STEEL,

And all other descriptions for machinists and agricultural purposes.

Warehouse, 30 Gold Street, New York.

Near John Street. HENRY MOORE, Agent.

S. & C. WARDLOW,

Sheffield, England,

Manufacturers of the Celebrated

Cast and Double Shear

STEEL.

In Bars, Sheets and Coils, for fine Pen and Pocket Cutlery, Table Knives, Mining Tools, Dies, Files, Clock and other Springs, and Tools of every variety.

Warehouse, 95 John Street, New York.

WILLIAM BROWN, Representative.

Cleveland Rolling Mill Co.,

Manufacturers of

BESSEMER STEEL

AND

Iron Rail and Fastenings,

SPRING STEEL

AND

WIRE OF ALL KINDS,

Tire, Axles and other Forgings,

Tiller Plate, Galvanized and Black Sheet Iron, Corrugated Roofing and Siding of Siemens-Martin, Bessemer Steel and Iron.

CLEVELAND, OHIO.

H. CHISHOLM, President. WM. CHISHOLM, Vice President.

E. S. PAGE, Secretary. W. B. CHISHOLM, Gen. Manager.

MIDVALE STEEL WORKS,

NICETOWN, PHILADELPHIA.

Best Warranted Cast Steel for Machinists' Tools,

Taps, Dies, Punches, Shear Blades, Chipping Chisels and Granite Rock Drills,

Extra Mild Center Steel, special for Taps,

ALSO,

MACHINERY AND CAST SPRING STEEL, HEAVY AND LIGHT FORGINGS.

Warehouse, No. 12 North 5th St., Philadelphia.

Address *A. M. F. Watson*, General Sales Agent.

STEEL Gautier Steel.

See Page 3.

Steel.

NEWARK STEEL WORKS.

BENJAMIN ATHA & CO.,

Manufacturers of

BEST REFINED CAST STEEL

And grades of Steel specially adapted for Lathe Tools, Chisels and Taps and Dies.

Warranted most superior for TOOLS AND GRANITE ROCK DRILLS.

A full assortment of this universally approved OLD BRAND and other Steels for sale by

EDWARD FRITH & SON, Agents,

No. 241 Pearl St., New York.

LABELLE STEEL WORKS.

SMITH, SUTTON & CO.,

MANUFACTURERS OF ALL KINDS OF

STEEL.

Also Springs, Axles, Rake Teeth, &c.

OFFICE & WORKS, Ridge, Lighthill & Belmont Sts., & Ohio River, Allegheny.

Post Office Address, Pittsburgh, Pa.

Represented at Boston by WETHERELL BROS., 31 Oliver St.; at Milwaukee by JOHN PRITCHARD, 43 to 49 West Water St.; at Chicago by S. D. KIMBARK, 80 to 84 Michigan Ave.

ALBANY & RENSSELAER IRON & STEEL CO.,

Troy, N. Y.,

Office in New York City, 56 Broadway,

MANUFACTURERS OF

BESSEMER STEEL RAILS,

Machinery Steel, Merchant and Ship Iron.

HORSE SHOES.

SAM'L G. B. COOK & CO., Agents for Southern States,

67 and 69 German Street, Baltimore, Md.

FRANCIS HOBSON & SON

97 John Street, NEW YORK,

Sole Manufact'rs of "CHOICE" Extra Cast Steel.

Manufacturers of all Descriptions of Steel.

Manufacturers of Every Kind of Steel Wire.

Don Works, Sheffield, England.

CHAS. HUGILL, Agent.

THE

STEEL COMPANY OF SCOTLAND, LIMITED,

(SIEMENS' PROCESS,)

MANUFACTURERS OF

Steel Rails,
Steel Blooms for Rails,
Steel Blooms for Wire,
Steel Wire Rods,
Steel Locomotive Fire Boxes,
Steel Ship Plates.
Steel Boiler Plates,
Steel Angles,
Steel Forgings,
Steel Castings.

JAMES LEE & CO.,

Resident Agents for the United States,

72 Pine Street, New York.

GEO. SANDERSON & CO.,

MANUFACTURERS AND

Importers of STEEL,

Removed to 30 Gold Street, New York.

Particular attention is paid to quality and temper for FILES, SAWS, EDGE TOOLS, TABLE and POCKET CUTLERY, TOOLS, TAPS and DIES; also for COLD ROLLED STEEL for CLOCK SPRINGS, CORSET CLASPS, &c.

A Large Assorted Stock of JOHN ROTHERY'S FILES always on hand.

MERIAM & MORGAN PARAFFINE CO.

CLEVELAND, O.,

Manufacturers of

OILS

Cold Pressed Paraffine Oil,

Refined Paraffine Wax,

AXLE GREASE,

And a full line of

Railway, Machinery, Signal and Miners' Oils.

PARAGON AXLE GREASE

BRANCH OFFICES:
32 Oliver Street, Boston.
143 Front Street, New York.

AXLE GREASE AGENCIES:
Robinson, Lord & Co., New York.
Ferris & Avery, Chicago.

See our advertisement in the Iron Age first issue of each month.

Beardsley Scythe Co.,

Manufacturers of

GRASS, GRAIN & BUSH SCYTHES,

Hay Knives & Corn Knives.

West Winsted, Conn.

Steel.

R. MUSHET'S Special Steel

FOR

LATHES, PLANERS, &c.

Turns out at least **double work** by increased speed and feed, **and cuts harder metals** than any other Steel. Neither hardening nor tempering required.

Sole Makers,

SAMUEL OSBORN & CO.,

Sheffield, England.

Represented in the United States by

B. M. JONES & CO.,

Nos. 11 & 13 Oliver Street, BOSTON.

STAR ★ BRAND

BLACK LEAD STOPPERS,

FOR

Bessemer Converters and Siemens-Martin Furnace Ladles.

All the regular sizes in stock, with Nozzles to fit each size. Special sizes or shapes made to order from sample or drawing.

Black Lead Crucibles, all kinds and sizes.

TAUNTON CRUCIBLE COMPANY,

Taunton, Mass.

D. A. TREFETHEN, Treas. W. T. MACFARLANE, Agent.

NAYLOR & CO.,

99 John St., New York. 6 Oliver St., Boston, Mass.

W. R. HART, Agent,

208 S. Fourth St., Philadelphia, Pa.

THOS. J. HOYT, Agent,

709 North Second St., St. Louis, Mo.

MANUFACTURERS OF

STEEL COMPRESSED SHAFTING,

"Benzon" Homogeneous Plates

For Boilers, Fire-boxes, &c.

Axles, Crank Pins, Spring Steel,

And all other kinds of

Martin-Siemens Steel and Iron

For Railroad purposes, &c.

IMPORTERS OF

IRON AND STEEL RAILS,

SWEDISH IRON,

Tin and Terne Plates and Metals.

JOHN STARR,

Hardware & Metal Broker,

AND

MANUFACTURERS' AGENT,

Halifax, Nova Scotia,

Representing in the Dominion of Canada several American Manufacturers, is ready to accept further Agencies. Satisfactory references.

Emery, Grindstones, &c.

Walter R. Wood,

GRINDSTONES.

Berea, O., Nova Scotia, & other brands

283 and 285 Front Street, New York.

BOYD & CHASE,

The largest manufacturers in the world of

OIL 

STONE

Of all description.

107th Street and Harlem River,

Send for Illustrated Price List. NEW YORK.

H. S. WOOD & CO.,

Manufacturers of	Importers of
Berea, O.,	Newcastle, Eng.,
Black River, O.,	Wickersley, Eng.
Lake Huron, Mich.,	Nova Scotia,

GRINDSTONES

33 West & 58 Washington Sts., N. Y.

THE VITRIFIED

Emery Wheel.

The only one made on scientific principles. *It runs dry, in water, or in oil.* Can be made hard enough for the hardest wood, and soft enough for the most delicate tools. It heats less than any other wheel. It will cut Iron, Steel, Brass, Silver, Copper, Marble, Granite and Wood; also, Rubber, Paper and Iron Rolls. Address

VITRIFIED WHEEL CO.,

100 Elm St., Westfield, Mass.

ASHLAND EMERY CO.

CHARLES ALDEN, MANAGER.

Importers and Manufacturers of PURE

TURKISH EMERY

A. A. IRVINE & CO., Agents,

14 Murray St., New York.

Send for quotations and samples.

PHILADELPHIA.

(Corrected Weekly by Lloyd, Supplee & Walton.)

Terms, 30 days. For 60 or 90 days, interest added at 10 per cent. per annum.

Anvils.
Peter Wrights, ℔ lb.....10¾c
Over 250 lbs.....11c
Eagle (American).....10c ℔ lb—dis 20 %

Apple Parers.
Keystone Centennial, 1875.....$4.25
" 1877.....5.00
Reading No. 73.....5.00
" No. 74.....6.00
" No. 75.....7.00
" No. 78.....7.50
Rotary Peach Parers.....13.50
Lots of 10 to 25 dozen special prices.

Axes.
Hunt's Kentucky and Yankee.....per doz $11.00
Mann's Red Warrior....." 11.00
Richland Chief....." 10.00
Beveled Axes.....add 50c " net
Double Bit Axes.....net " 22.00

Augers and Auger Bits.—New List January 1.
Bates' Nut Augers.....dis 40 %
Cook's Augers.....dis 40&10 %
Watrous' Ship Augers.....dis 15 %
Benjamin Pierce Auger Bits.....dis 35 %
Griswold Auger Bits.....dis 40 %
Cook's " .....dis 40&10 %
Jennings' " .....dis 10, 10&10 %
Bonney's Pat. Hol. Augers, list $48 ℔ doz..dis 20&10 %
Stearns' Pat. Hol. Augers, list $43 ℔ doz....dis 20&10 %

Balances.
Light and Common.....dis 15&10 %

Bells.
Bevin Bros. Mfg. Co. Light Hand Bells.....dis 60&10 %
Swiss Pattern Hand Bells.....low list dis 10&10 %
Connell's Door Bells.....dis 35 %
Gt. Western & Kentucky Cow, new list.....dis 50 %

Bolt and Rivet Clippers.
Chambers' No. 1, for ½ bolt.....each, $7.50 } dis 15 %
" No. 2, " ⅝ " ..... " 9.00 }
" No. 3, " ¾ " ..... " 12.00 }

Boring Machines.
Upright, without Augers.....List 5.50 } dis 40 %
Angular, without Augers..... " 6.75 }

Bolts.—Eastern Carriage Bolts.....dis 70&10 %
Philadelphia.....new list dis 60&10 %
Stanley, Wrought Shutter.....dis 50&10 %

Braces.—Barber's.....dis 40&5 %
Backus.....dis 60 %
Spofford.....dis 50&5 %
American Ball.....dis 40&10 %

Butts.—Cast Fast Joint, Narrow.....dis 40&10 %
" " Broad.....dis 40&10 %
Cast Loose Joint, Narrow.....dis 50&10 %
" " Broad.....dis 50&10 %
" Acorn, Loose Pin.....dis 50&10 %
" " " Jap'd.....dis 55&10 %
" Mayer's Loose Joint.....dis 55&10 %
Wrought Loose Pin.....dis 50&10 %
" Table Hinges and Back Flaps...dis 40&10 %
" Narrow, Fast.....dis 40&10 %
" Loose Joint.....dis 50&10 %

Blind Butts.
Parker.....dis 70 %
Clark.....dis 60, 10&10 %
Shepard.....dis 60, 10&10 %
Lul & Porter.....dis 60&10 %
Huffer's.....dis 50 %

Chains.—German Halter and Coil. new list Oct. 22, 1879.....dis 40 %
Galvanized Pump.....℔ lb 10c net
Best Proof Coil Chain—English.

℔ lb.	12	10	8½	7½	7	gold
	5-16	¼	5-16	⅜	7-16	½ in.

Chisels.—Socket Framing.....dis 65&10 %
Socket Firmer.....dis 65&10 %
Butcher's.....$5.00 to £ gold

Casters.—Bed (new list July 1, 1880).....dis 25&10 %
Plate.....dis 25&10 %

Coffee Mills.—Box and Side, new list Jan. 1, 1880.....dis 35 %
Enterprise.....dis 20 %

Cutlery.—Walden Pocket.....new list net
Landers, Frary & Clark, J. Russell & Co., Lamson & Goodnow Mfg. Co. and Meriden Cutlery Co., Manufacturers' prices net.

Drawing Knives.
Hart Mfg. Co.'s.....dis 65&10 %
Adjustable Handle.....dis 15 %

Fry Pans.
Tinned.....dis 45 %

℔ doz.	$3.50	4.00	4.50	5.00	5.50	6.50	7.50	9.00	10.00
No.	0	1	2	3	4	5	6		8

Burnished.....dis 60 %

℔ doz.	$3.00	3.75	4.25	4.75	5.25	6.00	7.00	8.00	9.00
No.	0	1	2	3	4	5	6	7	8

Files.
Nicholson.....dis 30 %
Disston.....dis 30 %
Butcher.....$4.50 ℔
Spencer.....$4.50 @ 4.75 ℔

Fluting Machines.
Eagle—3½ in. roll.....each, $2.15 } dis 10 %
" —5½ in. roll..... " 2.85 }
Crown—4½ in. roll..... " 3.40 }
" —6 in. roll..... " 4.00 } dis 10 %
" —8 in. roll..... " 4.50 }
Geneva Fluter.....dis 20 %
Favorite com Fluter & Sad Iron.....℔ doz $10.50 net

Hammers.
Yerkes & Plumb's, new list.....dis 30 %

Hatchets.
Yerkes & Plumb, new list.....dis 30 %
Hunt.....dis 15&5 %

Hinges.
Strap and T.....dis 45&10 %

Horse Nails.

	Nos.	5	6	7	8	9	10
Ausable		30	27	24	24	23	23
" Polished & Pt'd and Blued and Pointed.		31	28	2	25	24	23
Globe	New list.	28	25	23	22	21	20
Clinton		22	20	19	18	17	
" Polished & Pointed		23	21	20	19	18	

Porter, all sizes.....℔ lb 15c. net
Discount on Ausable and Clinton, 20 %; Globe, 10%

Locks and Knobs.
Branford.....dis 50&2 %
Gaylord Cabinet.....dis 10&2 % cash
American Padlocks.....dis 40 &2 % cash
Scandinavian Padlocks.....dis 50 %

℔ doz.	$5.00	5.50	6.50	7.50	8.50	10.50	12.50	} dis 60 %
No.	57	58	59	60	61	62	63	
℔ doz.			$18.00		26.00		33.00	} dis 60 %
No.			64		65		66	

Lanterns.
Nail City.....℔ doz., $9.00 net
Square Candle and Oil.....℔ doz
Tubular.....No. 0, $3.65; No. 1, $10.15 ℔ doz net
Globes, 35 cents extra per doz. net.

Lawn Mowers.—Pennsylvania.....dis 30&10 %
Philadelphia.....dis 30&10 %
Excelsior.....dis 30&10 %

Lawn and Garden Pumps.
Holland Patent.....List $5.00 dis 10 %

Mattocks.
Long and Short Cutter.....new list
Pennsylvania Pattern.....per doz

Molasses Gates.
Enterprise Mfg. Co.'s Measuring Faucets.....dis 20 %
Stebbins' Gates.....dis 50&10 %
Lincoln's " .....dis 50&10 %
Landers, Frary & Clark's Petroleum.....dis 20&10 %
Brass Liquor Cocks, new list Jan. 1 1880.....dis 40 %
Cork Lined " .....dis 70 %

Meat Cutters.—Pennsylvania Meat Cutter..dis 50 %
Dixon's.....dis 50 %
Woodruff.....dis 30 %
Stowe.....dis 30 %
Hale's.....new list, dis 30, 20&10 cash
American.....dis 25 %
Stuffers.....dis 25 %
Enterprise Stuffers.....dis 20 %

Pincers.—Ohio Tool Co.....dis 25 %
Scioto.....dis 30 % } 7½ % cash
Auburn.....dis 25 % } in 10 days.
New York Tool Co.....dis 30 % }
Bailey.....dis 20&10 %

Piano Irons.—Ohio Tool Co.....dis 10&5 %
Butcher's.....2, $5.50

Plumbs and Levels.
Stanley's Adjustable.....dis 60&10 %
" Non-Adjustable.....dis 60&10 %

Picks.—New list.....

Pumps.—Bickford.....$5.00, dis 10 %

Rules.—Stanley Boxwood.....dis 60&10 %
Stanley Ivory.....dis 40&10 %

Steelyards.—Hart's Pattern.....dis 30&10 %

℔ doz.	$14.50	17.75	21.00	26.50	31.00	35.50
Lbs.	50	100	150	200	250	300

American Pattern.....dis 30&10 %

℔ doz.	$8.00	10.25	13.75	14.50	16.75	19.50
Lbs.	50	100	150	200	250	300

Squares.
Steel and Iron.....dis 50 %; full case, dis 50&10 %
Try Squares, Stanley.....dis 45&10 %
Disston's Try Squares.....dis 7½ %

Scythes.—Golden Clipper, Damascus Blade, Boxed and Sharpened.....℔ doz $9.00 net
Clipper No. 10, Bronzed Blade, Boxed and Sharpened.....℔ doz $8.50 net
Clipper No. 5, Painted Red, Boxed and Sharpened.....℔ doz $8.00 net

Saws.—Disston's Hand, Panel and Rip.....dis 20 %
Disston's Circular.....dis 35 %
Cross-Cut No. 2, Plain Tooth.....dis 25%
" Patent Tooth.....dis 25%
" Champion Tooth.....dis 25%
Boynton's Lightning Cross Cut, new list.....dis 20 %
" One Man, all lengths, " .....dis 20 %
" Billet Webs, 30 inch, " .....dis 25 %
" Lightning Buck Saws, cross bar...dis 25 %
" " Hand, Panel and Rip....dis 25 %

Shovels and Spades.
Rowland.....dis 40&10 %
Oliver Ames & Sons, new list.....dis 10 %
Griffith.....dis 40&10 %

Sad Irons.—4 to 10 lbs.....℔ lb 9½c
Mrs. Potts' Patent.....dis 30 %

Stone.—Arkansas O.I Stone.....℔ lb $2.00 net
Washita Extra.....℔ lb 27c net
" No 1.....18c
" No. 2.....14c
" Slip's.....36c
" Axe.....18c net
Turkey Oil Stone No. 1.....℔ lb $1.00 net
Hindostan Oil Stone No. 1.....℔ lb 6c } dis 30 & 10 %
" Axe Stone..... " 8c }
" Slips..... " 100 }

Screws.
Flat Head Iron.....dis 45 %
" Brass.....dis 45 %
Round Head Brass.....dis 30 %
" Iron.....dis 40 %

Spoons.
Plated.....dis 33⅓&2½ %
German Silver.....dis 20&10 %
Britannia, Boardman's.....dis 60 %
" Parker's.....dis 60 %
Tinned.....dis 10 %

Springs.—Torrey.....℔ doz $2.10 10 %
Philadelphia....5 in., $5.00; 8 in., $7.00 ℔ doz. dis 25 %
Chatfield No. 1, $2.75; 2, $3.25; 3, $4.00 ℔ doz, dis 33⅓ %
Gem Coil No. 1, Large Jap'd.....℔ doz $2.50 }
" No. 2, Medium Jap'd..... " 2.50 } net
" No. 3, Small Jap'd..... " 2.00 }

Stocks and Dies......dis 10&5 %

Stove Polish.—Gem.....℔ gross, $1.50, dis 5 %
Dixon..... " 5.75 net
Onyx..... " $4.00 @ 4.25 net

Tacks, Brads, &c......dis 20&10 %
Shoe Nails—4-8, 90c; 3½-8, 100 ℔ lb..... 10 %
Double Pointed Tacks.....dis 40&5 %

Traps.
Genuine Oneida—Newhouse.....dis 30 %
Im. Oneida—Newhouse list, first qual.....dis 50 %

Vises.—Solid Box, Trenton new list.....dis 25 %

Wrenches.—Agricultural.....dis 6-&10 %
Coes' Genuine.....dis 50 %
" " Mechanics'.....dis 50&10 %
" " Mail. Bar.....dis 70 %
Philada. Tool Co., Duplex.....dis

Wire.
Bright or Ann'd, No. 0 to 18.....dis 45 to 50 %
" " No. 19 to 26.....dis 52½ to 57 %
" " No. 27 to 36.....dis 60 to 65 %
Coppered, 0 to 18.....dis 40 to 45 %
Tinned Broom Wire.....dis 47½ to 50 %
Galvanized No. 7 to 18....Market List, dis 35 to 37½ %

Wringers.
Peerless No. 2½.....$60.00
" " 2.....63.00
Universal, No. 2½.....60.00
" " 2.....63.00
Novelty, No. 10.....60.00
" " 2.....63.00

PITTSBURGH.

Merchant Iron.

TERMS.—Note or acceptance at 60 days, with current rate of exchange on New York, or a discount of 2 per cent. for cash, if remitted within 10 days from date of invoice.

Flat Bar.
1½ to 4 by ⅜ to 1 inch.....2.50c
4¼ to 6 by ⅜ to 1 " 2.60c
1⅝ to 6 by 1¼ to 1¾ " 2.90c
1¼ and 1⅜ by ⅜ to ¼ " 2.60c
1 and 1⅛ by ⅜ to ⅝ " 2.70c
⅝, ¾ and ⅞ by ⅜ to ⅝ inch.....2.90c

Rounds and Squares.
1 to 1⅞.....2.50c | ⅝ to 9-16.....2.70c
2 to 2⅜.....2.70c | ½ to 7-16.....2.90c
2⅝ to 3¼.....3.00c | ⅜.....3.10c
3⅜ to 4.....3.50c | 5-16.....3.30c
4¼ to 5.....4.00c | ¼.....3.40c
5¼ to 6.....2.60c | 3-16.....5.50c

Oval Iron.
⅞ to 1¼.....2.90c | ⅛.....3.30
⅜ to ¾.....3.10c | ⅓.....3.70

Half Oval and Half Round.
⅞ to 1¼ inch.....3.20c | ⅛ inch.....4.00c
⅝ to ¾ " .....3.70c | ⅜ " 5.50c

Horse Shoe.
⅝ to 1⅜ by 5-16 to ⅞ inch.....3.50c

Wagon Box Iron.
⅝ Inch, Nos. 13 and 14.....3.70
⅝ " " 11 and 12.....3.50
⅝ " " 13 and 14.....4.00
⅝ " " 11 and 12.....3.80
⅝ " " 13 and 14.....4.40
⅝ " " 11 and 12.....4.10

Heavy Bands.
3½ to 6 by ¼ and 5-16 inch.....2.70
1⅝ to 3¼ by ¼ and 5-15 " 2.70
1 to 1⅜ by ¼ and 5-16 " 2.80
⅜ to ⅝ by ¼ and 5-16 " 4.00
⅝ and ⅞ by ¼ and 5-16 " 3.40

Light Bands.
1⅛ to 6 by ⅛ to 3-16 .....3.00
1⅛ to 6 by Nos. 11 and 12.....3.10
1 to 1⅜ by ⅛ to 3-16.....3.10
1 to 1⅜ by Nos. 11 and 12.....3.20
⅞ and 13-16 by ⅛ to 3-16.....3.40
⅞ and 13-16 by Nos. 11 and 12.....3.50
⅝ and 11-16 by ⅛ to 3-16.....3.70
⅝ and 11-16 by Nos. 11 and 12.....3.80
⅝ and 9-16 by ⅛ to 3 16.....4.00
⅝ and 9-16 by Nos. 11and 12.....4.10
⅛ inch by ⅛ and 3-16.....4.30
⅛ inch by Nos. 11 and 12 .....4.40

Hoop Iron.
1¼ to 4, Nos. 13, 14 and 15.....3.30
1¼ to 2, Nos. 16, 17 and 18.....3.40
1¼ to 2, No. 19.....3.50
1¼ to 2, No. 20.....3.60
1¼ to 2, No. 21.....3.70
1¼ to 2, No. 22.....3.80
15-16, 1, and 1⅛, Nos. 13, 14 and 15.....3.50
15-16, 1, and 1⅛, Nos. 16, 17 and 18.....3.60
15-16, 1, and 1⅛, Nos. 19 and 20.....3.70
15-16, 1, and 1⅛, No. 21.....3.80
15-16, 1, and 1⅛, No. 22.....3.90
⅞, Nos. 13, 14 and 15.....3.70
⅞, Nos. 16, 17 and 18.....3.80
⅞, Nos. 19 and 20.....3.90
⅞, No. 21.....4.00
⅞, No. 22.....4.10
13-16, Nos. 13, 14 and 15.....3.90
13-16, Nos. 16, 17 and 18.....4.00
13-16, Nos. 19 and 20.....4.10
13-16, No. 21.....4.20
13-16, No. 22.....4.30
¾, Nos. 13, 14 and 15.....4.00
¾, Nos. 16, 17 and 18.....4.10
¾, Nos. 19 and 20.....4.20
¾, No. 21.....4.30
¾, No. 22.....4.40
11-16, Nos. 13, 14 and 15.....4.20
11-16, Nos. 16, 17 and 18.....4.30
11-16, Nos. 19 and 20.....4.40
11-16, No. 21.....4.50
11-16, No. 22.....4.60
⅝, Nos. 13, 14 and 15.....4.40
⅝, Nos. 16, 17 and 18.....4.50
⅝, Nos. 19 and 20.....4.60
⅝, No. 21.....4.70
⅝, No. 22.....4.80
⅝, No. 23.....4.90
9-16, Nos. 13, 14 and 15.....4.60
9-16, Nos. 16, 17 and 18.....4.70
9-16, Nos. 19 and 20.....4.80
9-16, No. 21.....4.90
9-16, No. 22.....5.00
9-16, No. 23.....5.10
½ inch, Nos. 13, 14 and 15.....4.80
½ " Nos. 16, 17 and 18.....4.90
½ " No. 21.....5.10
½ " No. 22.....5.20
½ " No. 23.....5.30

The prices under Hoop Iron do not apply to Cotton Ties.

1-10c per lb. extra will be charged for each gauge lighter than the lightest indicated.

1-10c per lb. extra will be charged for cutting Hoops to specified lengths.

Barrel Hoops.
1¼ to 2 in., cut to length.
9 to 11 lbs. per set of 6 hoops.....3.50c
8 lbs. and less than 9 lbs. per set of 6 hoops.....3.60c
Less than 8 lbs. per set of 6 hoops.....3.80c

Extras for Cutting to Length all Preceding Iron.
All Iron, including Tire.....1.10c

Tank Iron.
No. 9 and heavier.....3.30
" Wings.....3.50

Sheet Iron.

	Common.	Charcoal.	Juniata.
No. 10 to 14	3.50	5.00	6.50
No. 15 to 17	3.80	5.30	6.80
No. 18 to 21	4.10	5.60	7.10
No. 22 to 24	4.30	6.80	7.30
No. 25 & 26	4.50	6.00	7.50
No. 27	4.70	6.20	7.70
No. 28	5.10	6.60	8.10

All sheets No. 18 and lighter, over 30 inches wide, not less than 2.10c extra.

Wood's Patent Planished Sheet.
1st quality (A).....12c | 2d quality (B).....10½c

Galvanized Iron—Juniata.
Nos. 14 to 20.....12c | No. 27.....15c
Nos. 21 to 24.....13c | No. 28.....16c
Nos. 25 and 26.....14c | No. 29.....18c

Current discount to jobbers, 1st quality, 27½ %; 2d quality, 37½ %.

Coal Screen Iron.
4¼ by ⅝ by 5-16.....2.00c | 1 by ⅝ by 5-16.....3.50

Angle Iron.
2½, 3, 3½ and 4 inch.....3.30
1½, 1¾, 2 and 2½ inch.....3.30
1¼ inch.....3.40
1 " 3.60
1½ by 1 inch, for Plow Handles.....3.80
1½ by ¾ " " " 3.80
1⅛ by ¾ " " " 3.90

T Rail.
8 lbs. to the yard.....2.90c | 20 lbs. to the yard.....2.90
12 " " .....2.90 | 28 " " 2.90
16 " " .....2.90 | 40 " " 2.90

Splice Joints for 12, 16 and 20-lb. Rail, 40c each; 28 and 30 lb. Rail, 50c each; 40 lb., 60c each.
3½ by ⅝ and ⅛ Spikes for 20 and 28-lb. Rail.....4½c
2½ and 3 by ⅜ " " 12 and 16-lb. " 4½c
2½ by 5-16 " " 8-lb. Rail.....5½c

Flat Rails.—Punched and Countersunk.
1¼ to 2 by ⅛ to ⅝ inch.....3.00
1½ by ⅜ and 7-16 inch.....3.20
1¼ by ⅜, 7-16 and ½ inch.....3.50

Junista Nail Rods.....6.50
Norway " 8.00
Guard Iron, ¼x3½x3⅝ and ¼x3½x3⅝.....4.00
" ⅜x3½x9-16 and ½x3½x3⅝.....4.30
Drag Bars.....3.30
Dropper Bars.....3.80
Cylinder and Landside Iron.....3.90
Plow Beam Iron.....3.00

Nails.
10d to 60d.....$3.00

Best Quality Refined Cast Steel.
Square, Flat, Octagon and Round.
⅜ to 2 inches, inclusive.....13 c
5-16 and 2¼ to 3 inches.....14 c
¼ and 3¼ to 4 " .....15 c
7-32 and 4¼ to 5 " .....16 c
3-16 and 5¼ to 6 " .....19 c
5-32 inch.....23 c
⅛ inch.....31 c
Oil Well Steel Forgings.....21½c
No grade of Crucible Tool Steel shall be sold for less than above prices.

Machinery Steel.

	Crucible.	Bessemer & Open Hearth.
Ordinary Sizes, ⅜ to 2 inch Round	7½c	6c
5-16 and 2¼ to 3 inches	8½c	7c
¼ and 3¼ to 6 "	9½c	8c
7-32 inch	10½c	9c
3-16 "	12½c	11c

Square, Flat and Octagon, ½c extra throughout the list.
Cut to specified lengths, ½c extra.

Hammer Cast Steel.
2 inches and under.....8½c
Above 2 inches.....9½c

Sheet Steel.—Crucible.

	Best.	2d Qual.	3d Qual.	Bessemer & Open Hearth.
To 21 gauge	13c	11c	9c	6¼c

1c. extra for each additional gauge.
Cut to multiples or specified lengths, ¼c. extra.

Miscellaneous Cast Steel.
Auger and Auger Bit.....8½c
Axle Steel for carriages and wagons.....8½c
Frog Points and Plates.....10c
" Side Bars.....8c
Pick, plain.....9c
" and Mattock, beveled.....9c
Skate Steel.....5c
Table Cutlery.....8½c
Pike and Cant Hook.....9c
Coal and Granite Wedge.....9c
Roller.....7½c
Spindle, subject to Machinery classification.....8½c
Trap Spring Steel.....9½c
Forged Crank Pins and Lathe Spindles.....10½c
Piston Rods, plain.....8c
" forged to shapes.....10½c
Slide Bars, plain.....8c
" forged to shapes.....10½c

Crucible, Open Hearth or Bessemer.
Boiler, Fire-Box and Flue Sheets, not less than 3-16 thick.....
Boiler, Fire-Box and Flue Sheets, not less than ⅛ thick.....
Circulars and semi-circulars, when ordered separately.....
Smoke Stack, to shape.....
Locomotive Tank Steel.....

File Cast Steel.
Square, Round, Half Round and Flat Bastard, 8-inch and over.....9c
Mill Saw, 8-inch and over.....9½c
Taper, 3½-inch and over.....10½c
Horse and Shoe Rasp.....9½c

Spring Cast Steel.
Spiral and Taper, cut to lengths.....7½c

Tire Cast Steel.
1x¼ and over.....8c
1x3-16, ⅞x3-16 and ¼.....8½c
1 and 1⅛x⅜ and 5-32, ⅞x3-16 and 5 32.....9c
¾ and ⅝x⅛ and 3-32 and 12 g.....9½c
Solid Safe Cast Steel.....7½c

Agricultural Implement Cast Steel.
Fork and Rake, Crucible.....8½c
Horse Rake Steel, cut to lengths, Crucible.....9 c
Hoe, Crucible.....8 c
Corn Stalk Cutter, beveled.....9 c
Beveled Hoe and Shovel Steel in Bars.....9 c
Crucible Plow Steel in slabs.....8½c

Bessemer and Open Hearth.
Spring.....
" spiral and taper, cut to lengths.....
Tire, 3-16 thick and above.....
Toe Calk.....
Plow.....
Axle Billets.....
Sleigh Shoe.....
Cutter Shoe, cut to lengths and tapered.....
Scythe Back Steel.....
Grain Drill Bars.....
" Points.....
Rolling Coulter Blanks, cut and punched.....
Thrasher Steel.....
" Teeth.....
Rolled Hammer Billets.....

Where Bessemer or Open-hearth Steel can be used in place of Crucible, the difference in price shall not be greater than 1c. per lb., except where especially provided in the list.

Terms.—Four months; 3 per cent. discount for cash, if remitted within 30 days.

Rolls and Castings.
Furnace, Floor and Straightening Plates.....2½c
Housings and Castings not otherwise specified.....3 c
Guide Plates.....2½c
Spindles and coupling boxes.....3 c
Sand Rolls and Pinions, large size.....3 c
" " small size.....4 c
Pipe Mill Castings.....2½c
Rolling Mill Castings under 50 lbs.....4 c
Spur and Bevel Wheels, large.....2½c
" " small.....4½c
Pulleys up to 30 inches.....4½c
" over 30 inches.....4½c
Engine Castings, light.....4½c
" " heavy.....4 c

Chilled Rolls.
6 to 7 in. diam., 7 to 20 in. long.....2½c
8 to 15 in. " 8 to 40 in. " 3½c
25 to 24 in. " 15 to 77 in. " .....5 c
14 to 31 in. " 72 to 108 in. " .....5 c

White and Red Lead.
Strictly Pure White Lead in Oil, in kegs, in lots of 500 ℔ and over, 9c; less than 500 ℔, 9½c in 25 and 50 ℔ Tin Pails, ½c. ℔ lb over keg price; 12½ ℔ Tin Pails, 1c ℔ lb over keg price; assorted, 1 to 5 ℔, 100 ℔ cases, 12c.
Dry White Lead..less than 500 lbs., 8¾c; over 500 lbs. 8½c
Orange Mineral, genuine, in kegs, 10c; in barrels, 9 c
Red Lead, very brilliant, " 8c; " 7½c
Litharge (Potter's Lead) " 8c; " 7½c
Freights equalized with all points.
Terms: Note at sixty days, or if paid within 15 days from date of invoice, a discount of 1% per cent. will be allowed, but not otherwise.

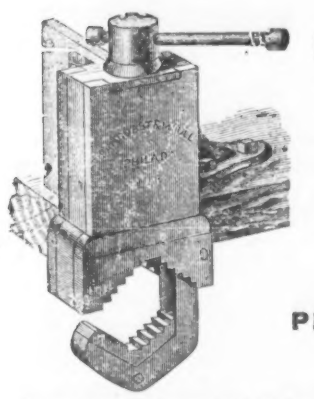
Window Glass.
Per Box of 50 Feet.—Discount 50&10 % on single strength, 60&10 % on double.

Single Strength.

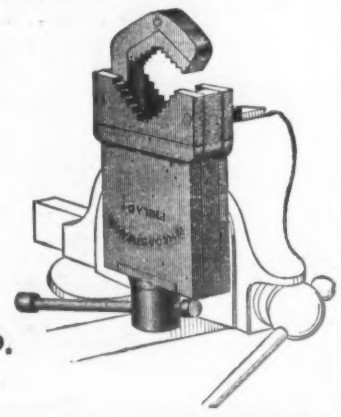
Size.	AA.	A.	B.	C.
6 x 8 to 10 x 15	$8.25	$7.50	$7.00	$6.50
11 x 14 to 16 x 24	9.25	8.50	8.00	7.25
18 x 22 to 20 x 30	10.75	9.75	8.75	7.75
15 x 36 to 24 x 30	12.25	10.75	9.00	8.50
26 x 28 to 24 x 36	13.00	11.50	9.75	9.00
26 x 36 to 26 x 44	14.50	13.25	10.75	9.50
26 x 46 to 30 x 50	15.00	14.00	11.25	10.50
30 x 52 to 30 x 54	16.00	14 50	12.00	
30 x 56 to 34 x 52	17.25	14.50	13.50	
34 x 58 to 34 x 60	18.25	17.25	14.00	
36 x 60 to 40 x 60	20.75	18.75	17.25	
Double Strength.				
6 x 8 to 10 x 15	12.75	11.75	10.75	10.00
11 x 14 to 16 x 24	14.50	12.25	12.50	11.25
18 x 22 to 20 x 30	17.25	15.75	14.00	
15 x 36 to 24 x 30	19.75	17.25	14.50	
26 x 28 to 24 x 36	21.00	18.50	15.75	
26 x 36 to 26 x 44	23.25	21.25	17.25	
26 x 46 to 30 x 50	24.00	22.50	18.00	
30 x 52 to 30 x 54	25.75	23.25	19.25	
30 x 56 to 34 x 52	27.75	25.00	21.75	
34 x 58 to 34 x 60	29.25	27.75	24.00	
36 x 60 to 40 x 60	33.25	30.00	27.75	

An additional 10 per cent. will be charged for all glass more than 40 inches wide. All sizes above 52 inches in length and not making more than 80 united inches, will be charged in the 80 united inches bracket.

IMPROVED PIPE-FITTERS' VISE.



STRONG,
LIGHT,
EFFICIENT,
CHEAP.



PRICE, $8.00.

To meet the requirements of the large number of persons who have use for such an article, we invite attention to our Improved Pipe Vise. This Vise can be used either as a permanent fixture to work-bench, attached to angle plate or can (unlike others) be held between the jaws of any Machinist's or Blacksmith's Vise; the movable jaw being OPEN ON SIDE permits work to be gripped at any desired point without slipping it in from end, and allows of FITTINGS BEING HELD securely; the Box is made of Malleable Iron, the Screw of Wrought Iron, and the remainder of Solid Steel throughout. The Steel Gripping Jaws can be duplicated and replaced at any time when worn out. It is a very convenient tool, well adapted to the wants of Plumbers, Pump Fitters, Well-Drivers, and all who have use for a tool that is *strong, light, efficient and cheap* which can be readily carried about with kit of tools.

MANUFACTURED BY

PANCOAST & MAULE,

243 and 245 South Third Street, Philadelphia.

Morse Twist Drill and Machine Co.,

NEW BEDFORD, MASS., Sole Manufacturers of

Morse Patent Straight-Lip Increase Twist Drill,

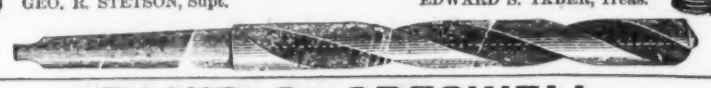
Beach's Patent Self-Centering Chuck, Solid and Shell Reamers.

BIT STOCK DRILLS,

Drills for Coes, Worcester, Hunter and other Hand Drill Presses. Beach's Patent Self-Centering Chucks, Center and Adjustable Drill Chucks, Solid and Shell Reamers. Drill Grinding Machines. Taper Reamers, Milling Cutters and Special tools to order.

All Tools exact to Whitworth Standard Gauges.

GEO. R. STETSON, Supt. EDWARD S. TABER, Treas.

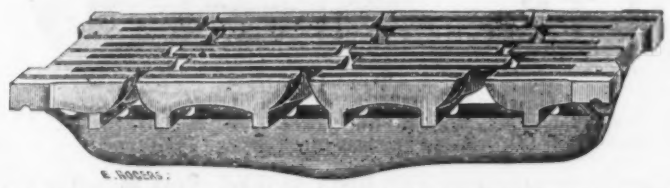


DAVID S. CRESWELL,

816 Race Street, - - - - PHILADELPHIA, PA.,

Manufacturer of

W. C. WREN'S PATENT GRATE BAR.



This Grate Bar consists of short parallel bars for carrying the coal, mounted above a long supporting bar, extending across the furnace by short transverse plates, holding the short bars, which sustain the heat so far above the supporting bar that it is kept comparatively cool, and is not, therefore, liable to warp, bend or burn. The bars which are subject to the heat, being made in short sections, do not strain the supporting bar. The short bars break joints at the meeting ends to prevent a straight open space across the whole; also to guide the rake used by firemen in cleaning the furnace better than they otherwise would.

We therefore claim the following advantages over other grate bars offered for sale:

1. Great saving in fuel.
2. Such construction as will equalize all strain resulting from expansion and contraction, thus avoiding warping, and thereby insuring long service.
3. Thorough combustion of fuel, owing to the large air spaces exposed.
4. Bars will not weigh more in proportion than the ordinary bar, and in addition to a saving of 25 per cent in fuel, will last much longer than any other bar in use.

The **WREN GRATE BAR** is in use at the works of the Atlantic Refining Co. and other prominent concerns.

ASBESTOS MATERIALS, FIBER, MILLBOARD, PACKING AND CEMENT.

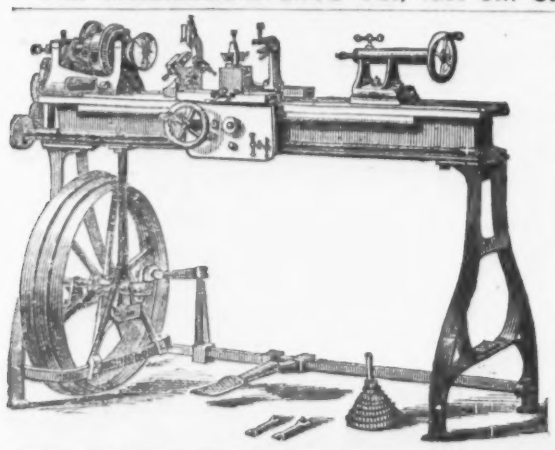
The Patent "Air Space" Coverings for Steam Pipes, Hot-Blast Pipes, Boilers, &c.

Plastic or Hair Felt, with or without the Patent "Air Space" Improvement.

THE NATIONAL STEEL TUBE CLEANER.

Saves its cost every time it is used.

THE CHALMERS-SPENCE CO., foot 9th St., E. R., New York.



Israel H. Johnson, Jr., & Co.

TOOL & MACHINE WORKS,

Manufacturers of

ENGINE, BRASS FINISHERS', WOOD TURNERS', AMATEURS' and JEWELERS' **LATHES.**

Slide Rest, Screw Machines, Turret Heads, Screw Presses, Screw Clamps, Lathe Carriers, &c.

440 N. 12th St., above Noble, Philadelphia, Pa.

Israel H. Johnson, Jr. Joshua R. Johnson, Jr.

PHILADELPHIA SCREW CO., Limited,

Twelfth and Buttonwood Streets, PHILADELPHIA.

Manufacturers of

IRON & BRASS WOOD SCREWS.

Quality, finish and tests as to strength guaranteed equal to any in the market.

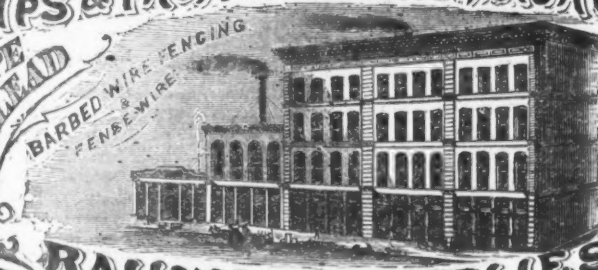
With improved facilities and largely increased capacity for production, we can fill orders promptly, and invite inquiries for discounts. A full line in stock.

L. M. RUMSEY & CO.

MANUFACTURERS & JOBBERS OF

PUMPS & IRON WORKING MACHINERY.

LEAD PIPE & SHEET LEAD — BARBED WIRE FENCING & FENCE WIRE — GAS PIPE & FITTING — PUMP CHAIN



RAILWAY SUPPLIES,

PLUMBERS & STEAM FITTERS BRASS GOODS, — BELTING, HOSE, PACKING &c.

No. 804 TO 820 N. SECOND STREET.

ST. LOUIS, MO.

Manufacturers of GALVANIZED PUMP CHAIN FOR CHAIN PUMPS.

PATENT

Expanding, Self-Draining

RUBBER BUCKET.

Manufactured only by

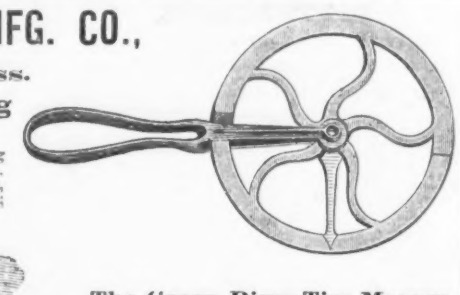
L. M. RUMSEY & CO.

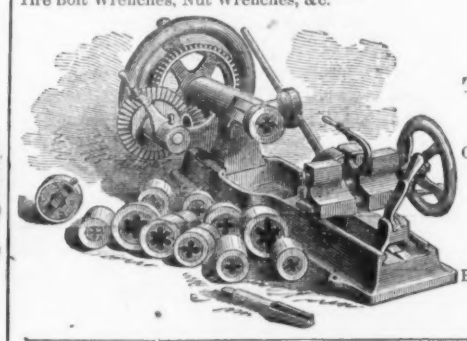
WILEY & RUSSELL MFG. CO.,

Greenfield, Mass.

Lightning Screw-Cutting Machinery and Tools,

Bolt Cutters for hand or power; Lightning Screw Plates, cutting from wire sizes to 1¼ in. Screw Plates for Threading Gas Pipe; Taps, Dies and Reamers for use in the Bit Brace; Tire Bolt Wrenches, Nut Wrenches, &c.





The Green River Tire Measuring Wheel.

Green River Drills, hand or power.
" Tire Benders.
" " Upsetters.
" Horse Shoers' Vises.

Special Screw Plates for use in stock or the Bit Brace.

Send for Illustrated Price List.

"BLAKE'S CHALLENGE" ROCK BREAKER.

Patented November 18, 1879.

BLAKE CRUSHER CO., new Haven, Conn., Sole Makers.

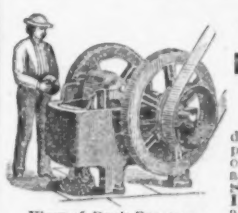
Awarded First-Class Medal of Superiority by the American Institute 1879.

Rapidly superseding all old styles of **Blake Crushers,** on account of its superior strength, efficiency and ease of adjustment. Adopted in preference by leading Mining and Railway companies, and many important cities and towns. Blake Crushers of our older style, containing patented improvements **exclusively our own,** for sale at low figures. The public is cautioned to beware of the representations of certain parties who have **imitated** our patterns of these, **copied our old cuts,** and are advertising **"Blake Crushers" weighing 1300 pounds less than ours,** at same price. For circulars relating to the new **"Blake's Challenge,"** and all older styles of Blake Crushers, address

BLAKE CRUSHER CO., New Haven. Ct.,

Patentees and Original Manufacturers under patents of Eli W. Blake and Theo. A. Blake,

The Farrel Foundry and Machine Co.



View of Rock Breaker.

ANSONIA, CONN.,

Manufacture improved

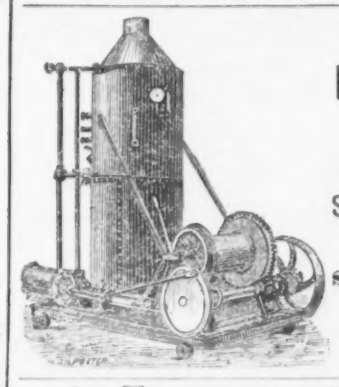
ROCK & ORE BREAKERS,

(THE "BLAKE" STYLE),

designed for breaking to small pieces and one-third dust all kinds of hard and brittle substances, such as **Quartz, Emery, Gold and Silver Ores, Coal, Plaster, Iron, Copper and Lead Ores;** also, **Stone** for making **Concrete and Railroad Ballast.**

Premium of Excellence, American Institute Fair, 1879.

Twenty years of practical test, at **Home** and **Abroad,** has proven this machine to be the best one ever invented for the purpose. Mr. S. L. MARSDEN, for the past fifteen years connected with the manufacture of these machines, has charge of this department of our works, and will personally superintend their erection within a reasonable circuit. **Chilled Rolls and Rolling Mill Machinery; Power Presses,** single and double acting; also, **Hammers,** Drops and Lifters; **Shafting, Pulleys and Hangers.**



A. J. DAVIS & CO.,

Patent Friction Hoisting Engines

For Mines, Quarries, Dock Building, &c.

MANUFACTURERS OF

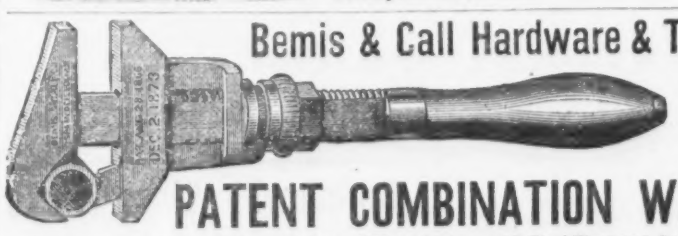
SHAPERS, DRAIN PIPE MACHINES, BAG AND SATCHEL MACHINERY,

Steam Engines, Wire Drawing Machinery, &c., &c.

69 N. J. R. R. Avenue, Newark, N. J.

Correspondence solicited.

Bemis & Call Hardware & Tool Co.



This Wrench can be furnished with Briggs' Pat. Nut or Sleeve.

PATENT COMBINATION WRENCH.

These Wrenches are made from the best of Wrought Iron, with Steel Head and Jaw, case-hardened throughout, and not only combine all of the superior qualities of our Cylinder or Gas Pipe Wrenches, but also all requisite Combinations of a regular Nut Wrench, thus making a combination which has no equal

For Circulars and Price List, address

BEMIS & CALL HARDWARE & TOOL CO., Springfield, Mass.

Armstrong's Improved Adjustable Stock and Dies

FOR PIPE AND BOLTS.

Tapped to the U. S. and Whitworth Standard Gauges. *Adjustable* to all variations in the size of fittings. Can be *resharpened without drawing the temper* by simply grinding them. Possessing practical advantages appreciated by all mechanics. Circular and Price List sent free on application.

Manufactured by F. ARMSTRONG, 30 Sterling St., Bridgeport, Conn.

WHITWELL HOT BLAST STOVES.

600 IN USE.

Witherow & Gordon

Sole Agents U. S.,

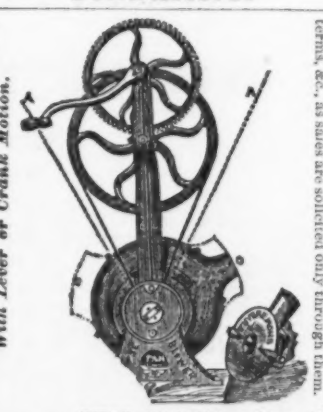
173 WOOD STREET,

PITTSBURCH, PA.,

Blast Furnace Engineers, Machinists and Contractors.

The Improved Eclipse Fan Blower.

With Lever or Crank Motion.



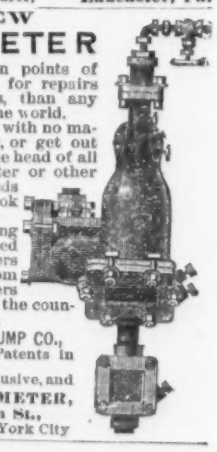
Acknowledged as the best: Is guaranteed as represented. The trade are invited to write for circulars, terms, &c., as sales are solicited only through them.

SHOP PRICES.	No. 1.	No. 2.
Improved "Eclipse" Fan Blower and Tuyere Iron, complete	$27.00	$18.00
Improved "Eclipse" Fan Blower, without Tuyere Iron	25.00	16.00
Improved "Eclipse" Fan Blower, complete, with Lever Attachment	30.00	20.00
Improved "Eclipse" Fan Blower, without Tuyere Iron & with Lever Att'chm't	27.00	18.00
Tuyere Irons alone	3.00	2.00
The above includes a Patent Adjustable Elbow and Pipe, Oil Can, &c.		
Exhausters for ventilating mines, complete	28.00	20.00

Full printed directions for working accompany every machine.

EZRA F. LANDIS,
Sole Manufacturer, Lancaster, Pa.

THE NEW PULSOMETER



Is more economical in points of original cost, expense for repairs and running expenses, than any other steam pump in the world.

Simple and compact, with no machinery whatever to oil, or get out of order, it stands at the head of all means of elevating water or other liquids by steam. It needs no skilled labor to look after it.

Send for book giving full description, reduced prices and many letters of commendation from leading manufacturers and others throughout the country who are using them.

PULSOMETER STEAM PUMP CO.,
Sole owners of Hall's Patents in the U. S.,
131,514 to 131,543, both inclusive, and
THE NEW PULSOMETER,
Office, **No. 83 John St.,**
P. O. Box No. 1533, New York City

Flanders' Improved Locomotive Cylinder Boring Machine.

Bar and screw of cast steel, with two extra cutter heads. Manufactured and for sale by the

L. B. FLANDERS MACHINE WORKS,

1025 Hamilton St., Philadelphia, Pa.

The Buckeye

Upright Drill Press

Is the cheapest and best made. Price, $15. Weighs 65 pounds. Discount to the trade. Send for circular to

A. E. Folger & Co.,

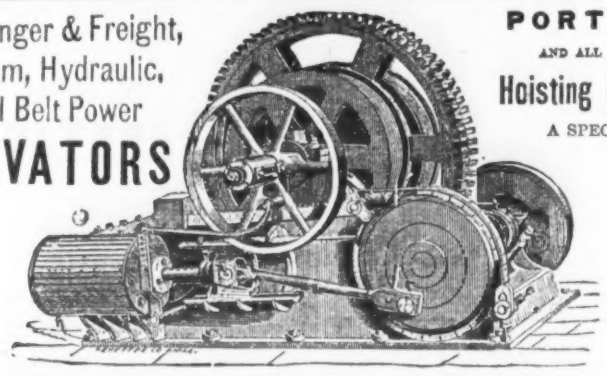
Springfield, O.

BOSTON.

Reported by Macomber, Bigelow & Dowse, 156 to 164 Oliver St.

Anvils.—"Eagle American" ₱ lb 6½c. dis 20 %
Apple Parers.
Reading "78" per doz., $7.50
Reading "70" per doz., 6.00
Reading "72" per doz., 5.00
Goodell Turn Table per doz., 5.50
Goodell Improved Turn Table per doz., 7.50
Goodell Family Corer and Slicer per doz., 7.00
Hudson's Improved "80" per doz., 6.00
Goodell Lighting per doz., 6.00
Aiken's Tools. dis 40&10 %
Anvil & Vise.—
No. 1, $6.25; 2, 4.25; 3, 3.40 each dis 25 %
Augurs & Bits.—Snell's Auger dis 40 %
L'Hommedieu's Ship Augers dis 15 %
Jenning's Bitts dis 10&10 %
Cook's Bitts dis 40&10 %
Sheparson's Double-Cut Bitts dis 45 %
" " Gimlets dis 40 %
Stearn's Extension Hollow Augers—
No. 2, ₱ doz, $48.00, No. 3, ₱ doz, $66.00 list, dis 20 %
Bonney's Extension Hollow Augers ₱ doz $36.00
Pierce's Bitts dis 35 %
Griswold " dis 40 %
Axes.—Blue Jackets per doz 5.00
Red Cross per doz 8.00
" Hatchet per doz 12.00
Dowse " Boys' dis 33⅓ %
Ax Handles.—
Oak Extra, 31 in., No. A ₱ doz $2.00
" 34 in., No. A ₱ doz 2.25
" 31 in., No. B ₱ doz 1.50
" 34 in., No. B ₱ doz 1.75
" 31 or 34 in., No. C ₱ doz 1.15
Axle Clips. dis 10 %
Balances.—Chatillon's dis 15&10 %
Barn Door Rail.—
Cast Angle (for Anti-Friction Hangers) per ft. 30
" Half-Round per ft, ⅝, 50 ⅞, 60c
Wrought " per ft, ½, 40; ⅝, 50; ¾, 60
Bells.—Conner's Crank Gong reduced list dis 20&10 %
Bird Cages.
Japanned M. B. & D., reduced list, 1879 dis 40 %
Brass " " 1879 dis 33⅓ %
Blind Fasts.—Lock Fasts ₱ C sets $5.00
No. 6 Fasts ₱ C sets 6 50
Veazie Fasts ₱ C sets 6.50
Shedd's ₱ C sets 7.00
Blind Hinges.—Mall. Hook, 3 holes ₱ C sets 8.50
Brad Awl Handles.—
Phœnix Adjustable ₱ doz $2.00
Bolts.—Norway Iron Carriage dis 70&5 %
Common " dis 80&5 %
Borax.—Refined ₱ lb 12c
Boring Machines.
Eagle Upright each, $5.50 list } dis 40 %
Eagle Angle each, 6.75 list }
Snell Augers ₱ set 4.70
Braces.—Barber's dis 40 %
Spofford's dis 50 %
Backus' dis 50 & 10 %
Bracket Saws.—Holly Scroll Saw each, $2 50
Demas Lathe and Scroll Saw 6 50
Bracket Saws, extra quality, to No. 4 ₱ gro $0.75
Steel Frame, with patterns ₱ doz 0.50
Lester dis 20 %
New Rogers, all iron dis 25 %
Bracket Saw Blades.
Griffith's patent ₱ gross 75c
Brackets.—B. B. & M. Flower Pot reduced list—
dis 25&10 %
Bronzed Shelf, M. B. & D. newlist dis 50 %
Store Shelf dis 40 %
Bronze Hardware.—
Butts.—Union Fast Joint dis 40₱10 %
" Loose " dis 5&10 %
" Japanned Acorn dis 55&10 %
" Silvered " dis 55&10 %
" Boston Finish dis 70&10 %
Union Spiral Spring dis 25&10 %
Wrought Brass dis 45 %
Carriage Bolts.—Eagle Norway dis 75&5 %
Common dis 80&5 %
Carriage Jacks.
"Climax" No. 1 ₱ doz $20.00
" No. 1½ " 14.00
" No. 2 " 12.50
"Universal" dis 25 %
" No. 1 each, $2.00
" No. 2 " 3.00
" No. 3 " 6.00
" No. 4 " 6.00
" No. 5 " 6.50
Cartridges.—U. S. Cartridge Co. dis 60&10 %
Cards.—Watson's makeHorse and Curry dis 10 %
" Cotton dis 10 %
" Wool dis 10 %
Casters.—Bed and Table dis 25&10 %
Chain.—Traces 6½, 10, 4, straight ₱ pair 45c
" 6½, 10, 4, twisted ₱ pair 50c
" 7, 12, 2, " ₱ lb 17½c
Coil 3-16 ₱ lb 11 c
" ¼ ₱ lb 8½c
" 5-16 ₱ lb 8 c
" ⅜ ₱ lb 7 c
" 7-16 ₱ lb 6½c
" ½ ₱ lb 6½c
Chalk.—White, Carpenter's ₱ gross 50c
Red, Carpenter's ₱ gross 85c
Blue " ₱ gross $1.00
Chisels.—Hart, Bliven & Read, Framing dis 5&10 %
Underhill, Framing dis 20 %
Buck's Chisels dis 30 %
Clothes Line.—
Galvanized Wire, 100 feet each ₱ doz $4.50
Coat Hooks.—"Dover."—Galvanized, new list dis 50 %
Japanned, new list dis 50 %
Coffee Mills.—New list dis 35 %
Copper Rivets. dis 35 %
Cow Ties. dis 33⅓ %
No. 30, 3 ft. No. 6 Wire, with toggle ₱ doz $3.00
No. 35, 3 ft. " " with snap ₱ doz 3.80
No. 40, 3½ ft. " " with toggle ₱ doz 3.90
No. 45, 3½ ft. " " with snap ₱ doz 4.10
No. 50, 4 ft. No. 4 " with toggle ₱ doz 4.20
No. 55, 4 ft. " " with snap ₱ doz 4.75
No. 60, 4½ ft. " 3 " with toggle ₱ doz 5.38
No. 65, 4½ ft. " 4 " with snap ₱ doz 5.94
Cocks.—Brass, L. F. & C. dis 40 %
Cordage.—Manila, usual trade dis 10 % ₱ lb 19½
Jute ₱ lb 9½
Crow-Bars.—Cast Steel ₱ lb 5c
Iron Steel Pointed ₱ lb 4c
Cutlery.—Pocket, American Shear Co.'s dis 40 %
Butcher Knives, "Woods," Lap Bolster,
Square Handle dis 25 %
Steak Knives dis 25 %
Lap Bolster, Oval Handle dis 10 %
Sheaving dis 25 %
Skinning dis 25 %
Butcher, Common Round Handle, "Woods" dis 25 %
Shoe Knives, "Woods" dis 15 %
Dividers.—Cook's dis 25 %
Dog Collars. dis 25 %
Dog Muzzles.—Automatic dis 10 %
Door Springs.—Torrey's Rod ₱ doz $7.00
Imitation Torrey's Rod dis 50 %
Gem Coil dis 10 %
Crown dis 50&10 %
Warners ₱ doz $1.40
Door Stops.—"Thurston's" dis 25 %
Drawer Knobs.—"Thurston's" dis 25 %
Drills.—Morse Bit Stock dis 25 %
Morse Straight Shank dis 25 %
Emery.—Wellington Mills ₱ lb 5c
The Akron Emery Co. ₱ lb 5c
Turkish in 10 lb cans ₱ lb 5c
Enamelled Ware.
Standard Mfg. Co. Kettles dis 45&10 %
" " Sauce Pans dis 45 %
Felloe Plates.—Wrought ₱ lb 9c
Files.
American File Co. dis 25 %
Nicholson " dis 30 %
Fluting Machines.
Knox list, $8.00 dis 10 %
American list, $8.00 dis 10 %
Forks. W. C. & Co., Manure dis 25 %
Gimlet Bitts.
Genuine German, No. 12, 1-32 to 8-32, per doz $1.00
Pierce's ₱ doz 85c
Glass Cutters.
Combination Glass Cutter and Knife Sharpener ₱ doz $1.00
Grub Hoes.—K. P. & Co.'s No. 2, 11.50 ₱ doz dis 10 %
Hammers.—Maydole's dis 10 %
Hammond's (new list) dis 20 %
Hangers & Rollers.—Anti-Friction dis 50&10 %
Acme Rollers dis 50 %
Climax dis 50 %
Common Hangers dis 50&10 %
" Rollers dis 50&10 %
Hand Screws. dis 10 %
Hatchets.—C. P. Dowse new list dis 30&5 %
Underhill dis 25 %
Hay Knives.—Lightning ₱ doz $18.00 net
Fisher's Patent ₱ doz 0 11.00
Hinges.—Strap and T (new list) dis 45&10 %
Providence Plate ₱ lb 85
Wrought Screw Hook ₱ lb 85
Hoes.—W. C. & Co.'s dis 40 %
Hooks and Staples.—Brewers' dis 40 %
Horse Nails. No. 9 7 8 9
National Finished .23 .21 .20 .19 dis 20 %
Putnam Pointed .22 .24 .23 .22 10 %
Horse Nails.—Bridgewater dis 25 %
No. 5 24; No. 6, 22; No. 7, 21; No. 8, 20; No. 9, 19.
Ice Cream Freezers.—"Packer's" dis 40 %
Knobs.—"Norwalk." New list dis 30 %
Silver Glass dis 50&10 %
" Bell Pulls dis 50&10 %
Lanterns.—Guarded No. 0 ₱ doz $ 7.50
Tubulars, No. 9 ₱ doz 7.50
Railroad, Oil, No. 45 ₱ doz 9.00
Triangular ₱ doz 1.00
Hurricane dis 20 %
Lead.—Sheet ₱ lb 7 c
Pipe ₱ lb 8 6½c
Locks.—Norwalk Genuine Bronze Goods dis 50 %
Eagle Cabinet dis 10 %
" Trunk dis 10 %
W. Wilcox & Co., Padlocks dis 50 %
American Lock Co.'s Steel Key dis 50&10 %
Manure Forks.—W. C. & Co. dis 20 %
Mattocks.—K. P. & Co., Long Cutter, 16.00 ₱ doz. dis 50 %
K. P. & Co., Short Cutter, 15.50 ₱ doz. dis 50 %
" Pick " 16.00 ₱ doz. dis 50 %
Measuring Tapes.—Eddy's dis 25 %
Meat Cutters.—Sillies' Challenge dis 30 %
Hale's, (New list) dis 30 %
American dis 30 %
Money Drawers.—Tucker's Alarm ₱ doz $25.00
Mouse Traps.—Delusion ₱ doz 2.00
Novelty ₱ doz 1.75
Nails. ₱ keg, 3.15 rates
Oilers.—Zinc and Tin dis 45 %
Brass and Copper dis 45 %
Ox Bows.—Extra finished and varnished list net
1¼ in., ₱ doz. pair, $5.75; 1½ in., ₱ doz. pair, $8.00
1¾ in., " " 8.00; 2 in., " " 11.00
Padlocks.—W. Wilcox & Co.'s dis 50 %
Paper.—Tarred Sheathing ₱ lb 2½c
Dry Sheathing ₱ lb 2½c
Picks.—K. P. & Co., Adze Eye, 5 to 9, $12.00 dis 50 %
" " 9 to 7, 13.00 dis 50 %
Planes.—Greenfield Tool Co. dis 25 %
N. Y. Tool Co. dis 25 %
English Iron dis 20 %
Bailey's dis 20&10 %
Plated Ware.—Rogers & Bro. dis 45&5 %
Pliers.—Vom Cleff & Co.'s list
Burton's Wire Pliers dis 20 %
Plumb & Levels.—Stanley, R. & L. Co. dis 60&10 %
Pocket Knives.
American Shear Co.'s dis 25&10 %
Points Diggers.—W. C. & Co. reduced list dis 50 %
Pulleys
Acme or Excelsior, 12 in. ₱ doz 2.00
" " 2 in. 2.00
Pulley Blocks dis 40 %
Pumps.—Union Manufacturing Co.
Iron Cistern dis 10 %
" Pitcher Spout dis 30 %
Copper dis 30 %
Rivets.—Black dis 30 %
Carriage in 50 lb papers dis 30 %
Copper dis 30 %
Razors.—Torry's dis 10 %
Razor Strops.—Torrey's dis 10 %
Rules.—Stanley dis 10&10 %
" Ivory dis 50&10 %
Sadirons.—Common ₱ lb 5 c
Laundry ₱ lb 5 c
Tailor's Geese ₱ lb 5 c
Enterprise, "Potts" dis 10 %
Sash Locks.—King & Hutchinson's new list dis 40 %
Sandpaper.—Baeder & Adamson ₱ lb 8½c
M. B. & D. dis 33⅓ %
Sash Weights.—Patent Eye ₱ lb 1½c
Saws.—Hand Saws, Disston's dis 20 %
Wheeler & Clemson dis 20 %
Cross-Cut Saws.
W. M. & C., Common Tooth, No. 1 ₱ foot 75c
" " Champion " ₱ foot 85c
Disston's, Common " ₱ foot 70c
" Gt. American " ₱ foot 75c
Boynton's Lightning " ₱ foot 45c
M. B. & D., Hand Saws dis 25 %
W. M. & Co.'s Circular Saws dis 25 %
Richardson Bros. dis 25 %
Saw Blades.—Disston dis 25 %
W. M. & C. dis 25 %
Welch & Griffith, Extra doz $8.40
" " No. 2 doz 7.00
Scales.—Fairbanks dis 25 %
Screws.—Alden's Flat Head Iron dis 25 %
American Flat Head Iron dis 25 %
" " Brass dis 25 %
" Round-Head " dis 25 %
" " Iron dis 25 %
Grilley " Nickel-Plated Common dis 40 %
Scythes.—Clippers, in boxes ₱ doz $9.00
Shaves.—Kimball's inch 7.00
Watrous dis 30 %
Shears.—American Shear Co., new list dis 30 %
Shot.—Tatham's ₱ lb 7½c
Shovels.—O. Ames, new list dis 10 %
O. Ames, other brands, new list dis 10 %
M. B. & D. dis 10 %
Oxford Birmingham Pattern dis 10 %
Sinks.—Magee Patent Cts 30
Snow Shovels.—Malleable tips dis 25 %
Skates.—Union dis 25 %
Acme dis 25 %
Stock and Dies.—King's dis 10&5 %
Tacks.—A. Field & Son's dis 25 %
Pittsfield dis 2 & 5 %
Swedes Finished dis 25 %
Swedes Iron dis 25 %
Gimp and Lace dis 25 %
Copper Tacks dis 25 %
All balances on list dis 25 %
Traps.—Oneida, Genuine dis 25 %
Oneida, Imitation, H. & N. dis 50 %
Blake's dis 10 & 10 %
Vises.—Simmons's Adjustable dis 25&5 %
Howard Vise Co. dis 25 %
Prentiss' dis 25 %
Weather Strips.—Packer's ₱ doz 84c
Browne's Flexible Rubber dis 25&5 %
In 25 feet boxes; No. 1, ½ in. wide, ₱ yard 10c; No. 2, ⅝ in., 12c.; No. 3, ¾ in., 14c.; No. 4, 1 in.,
Black Walnut Spring Weather Strips ₱ doz. $1.50
Window Springs. dis 30 %
Babcock's No. 3 ₱ gross $ 6.50
" " 4 ₱ gross 4 15
Wire Cloth.—"Clinton" ₱ ft. 3½c
Wire Fence.
Scutt's Patent, Painted ₱ lb 3½c
" Galvanized ₱ lb 3½c
Wire Goods.—Gate Hooks and Eyes, &c. new list dis 60&10 %
Wrenches.—A. G. Coe's dis 25 %
Girard Mfg. Co. dis 25 %
Girard Agl. dis 25 %
Wringers.—Universal No. ₱ doz $60.00
Universal, No. 2½ ₱ doz 48.00
Novelty, No. 10 ₱ doz 18.00
" No. 2 ₱ doz 15.00
" No. 22 ₱ doz 17.00
Excelsior, No. A ₱ doz 75.00
" No. B ₱ doz 75.00
" No. CC ₱ doz 60.00
Novelty Set Tub, E ₱ doz 60.00
Eureka ₱ doz 48.00
Keystone, Wood Frame No. 1½ ₱ doz 51.00
" Iron Frame No. 2½ ₱ doz 51.00
Zinc ₱ ₱ 7½c
Withington, Cooley & Co.—Hoes, Rakes, Forks &c dis 40 %. Special rate for Export.

Passenger & Freight,
Steam, Hydraulic,
and Belt Power
ELEVATORS



PORTABLE
AND ALL KINDS OF
Hoisting Machinery
A SPECIALTY.

IRON FURNACE HOIST,

For Handling Stock to Top of Stack with One or Two Platforms.

STOKES & PARRISH, 3001 Chestnut St., Philadelphia.

THE MACKENZIE PATENT CUPOLA & BLOWER.

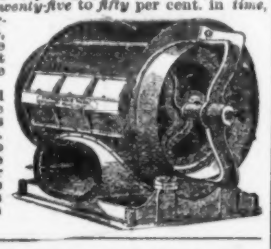
Send for circular to

Smith & Sayre Mfg. Co.,

PROPRIETORS, 21 Cortlandt St., New York.

This Cupola has made a great revolution in melting Iron. It differs from all others in having a CONTINUOUS TUYERE, or in other words, the blast enters the fuel at all points. Above one ton capacity per hour, they are made *oval in form*. This brings the blast to the center of the furnace with the *least resistance* and *smallest* possible amount of power, and in combination with the continuous Tuyere causes complete diffusion of the air throughout the furnace, and uniform temperature, melting *ten* or *fifteen tons* an hour with the pressure of blast required to melt *two* or *three tons* in an ordinary Cupola. It also enables us to save very largely in *time* and *fuel*, the experience of our customers showing a gain of *twenty-five* to *fifty* per cent. in *time*, and *twenty-five* to *forty* per cent. *fuel* over the ordinary Cupola, and a BETTER QUALITY OF CASTING, especially in light work. This is due to the thorough diffusion of the air and more perfect combustion, extracting less carbon from the iron, making a softer and tougher casting.

We manufacture these Cupolas of any desired capacity, numbered from 1 to 20, inclusive, the numbers indicating the melting capacities in TONS PER HOUR—No. 1, one ton,; No. 2, two tons; No. 3, three tons per hour, and so on up to 15, or 20 tons. We have *improved* the *construction* of these Cupolas in every way, have increased their strength and durability, and sought to make them as convenient for working and repairs as our own and the experience of our customers could suggest.



MAGIC PLATE FOR PIPE.

No. 1	threads and cuts off		⅛ to ¾
No. 2	"	"	¼ to 1¼
No. 3	"	"	½ to 2
No. 4	"	"	1½ to 3
No. 5	"	"	2½ to 4
Size A	threads bolts		¼ to ¾
Size B	"	"	¼ to 1

THE STOCKWELL SCREW & MACHINE CO.,

CLEVELAND, O.

$ $ $ $ SAVED $ $ $ $

1977 NINETEEN HUNDRED SEVENTY-SEVEN **1977**

MACHINES

BOTH NEW AND SECOND-HAND

COMPRISING
MACHINE AND BLACKSMITH
TOOLS OF EVERY DESCRIPTION.
WOOD-WORKING MACHINERY IN ALL ITS
BRANCHES. PORTABLE ENGINES. UPRIGHT and HORIZONTAL STATIONARY ENGINES, 1 TO 300 HORSE POWER. LOCOMOTIVE FIRE-BOX, HORIZONTAL, and UPRIGHT BOILERS, 1 TO 100 HORSE POWER. WATER WHEELS, COTTON AND WOOLEN MACHINERY, STEAM PUMPS, GRISTMILL MACHINERY,
Etc., FULLY DESCRIBED, AND
PRICES ANNEXED,

S.C.F.&CO.

☞ Send stamp for same,] In our List No. 23. [stating what you want. ☜

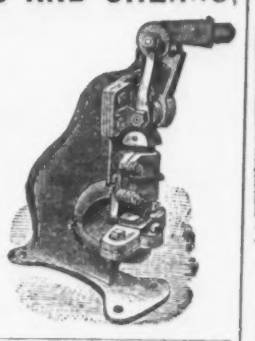
We have the Largest Assortment of Machinery to be found in the hands of any firm in the country.

Works and Main Office, Manchester, N. H. **S. C. FORSAITH & CO.**

Branch Office and Wareroom, 209 Center street, New York City.

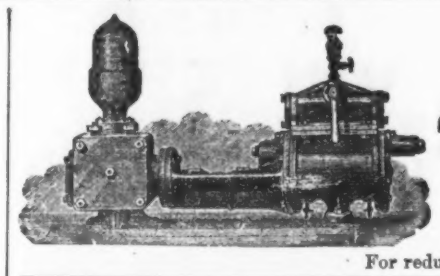
LYON'S HAND OR POWER PUNCHES AND SHEARS.

For Round, Flat or Square Iron,
ALSO,
Polishing & Buffing Machinery,
HYDRAULIC JACKS,
To raise from 2 to 120 tons.
HYDRAULIC PRESSES,
For special and general use.
HYDRAULIC HAND & POWER PUMPS
with 1 to 6 plungers, to run hydraulic presses, with either uniform or changeable speed.
Second-Hand Presses.
E. LYON & CO.,
470 Grand Street, - NEW YORK.
Send for circular of what you want.



CINCINNATI CHAIN HOIST CO.,

81 and 83 East Third St., Cincinnati, Ohio,
Sole Agents in adjacent states for
BOXE'S SCREW HOISTS,
Watchman's TIME DETECTORS at $40.00 to $75.00.
Send for Catalogue.



A. S. CAMERON'S PATENT "SPECIAL" STEAM PUMP

Is the Standard of Excellence at Home and Abroad

For reduced price lists address A. S. CAMERON, East 23d Street, New York.

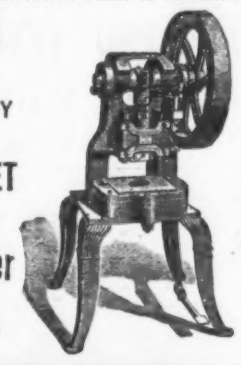
Bliss & Williams,

MANUFACTURERS OF ALL KINDS OF

PRESSES and DIES.

Also Manufacturers of
SPECIAL MACHINERY
FOR
WORKING SHEET METALS, &c.
FRUIT & other CAN TOOLS.

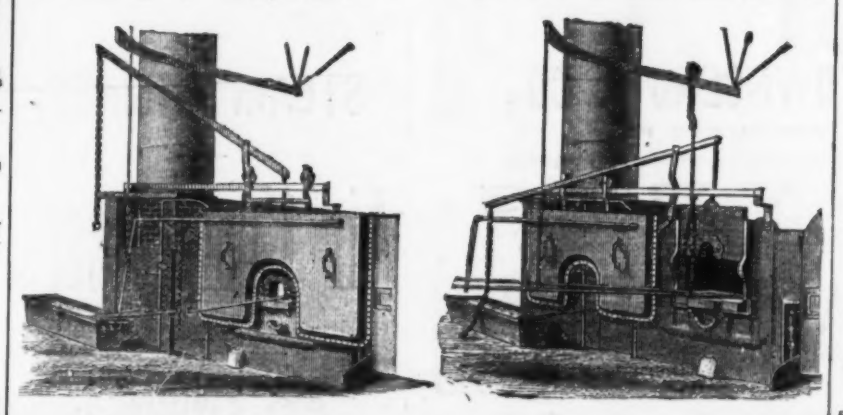
GOLD MEDAL AWARDED



Plymouth, Pearl and John Streets,
BROOKLYN, N. Y.,
U. S. A.

PARIS EXPOSITION, 1878.

McDONALD'S PATENT SHIELD.



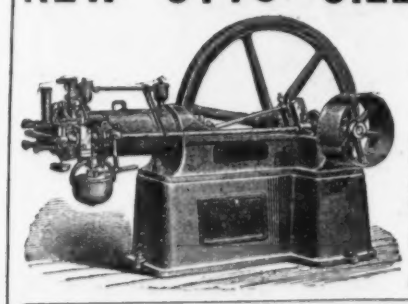
For Protecting the Men from Heat when Working in Front of Puddling, Heating and other Furnaces.

H. McDONALD, Patentee,

MANAGER SLIGO ROLLING MILLS,

PITTSBURGH, PA.

NEW OTTO SILENT GAS ENGINE.



Working Without Boiler, Steam, Coal, Ashes or Attendance.

Started Instantly by a Match, it gives Full Power Immediately.

When Stopped, all Expense Ceases.

No explosions, no fires nor cinders, no gauges, no pumps, no engineer or other attendant while running. Recommended by insurance companies.

UNSURPASSED IN EVERY RESPECT for hoisting in warehouses, printing, ventilating, running small shops, &c.

2, 4 and 7 H. P. and upwards. Built by

SCHLEICHER, SCHUMM & CO.,
Engineers and Machinists,
3045 Chestnut Street, Philadelphia.

Ludlow Valve Mfg. Co.,

OFFICE AND WORKS:

938 to 954 River St. & 67 to 83 Vail Ave., Troy, N. Y.,

VALVES.

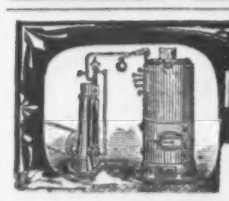
Double and Single Gate, ¼ in. to 48 in.—outside and inside Screws, Indicator, &c for Gas, Water and Steam. Send for Circular.

Also FIRE HYDRANTS.

THORNE, DeHAVEN & CO., Drilling Machines,

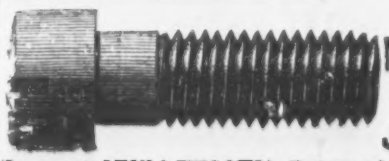
21st Street, above Market, Philadelphia.

PORTABLE DRILLS. Driven by power in any direction.
RADIAL DRILLS. Self-feed—Large Adjustable Box Table.
VERTICAL DRILLS. Self-feeding.
MULTIPLE DRILLS. 2 to 20 Spindles.
HORIZONTAL BORING AND DRILLING MACHINES.
HAND DRILLS. CAR BOX DRILLS.
SPECIAL DRILLS: For Special Work.



ORAM & ATHERTON

NEW AND SECOND HAND MACHINERY.
STAVE MACHINERY A SPECIALTY.
Office and Works, 155 & 157 RIVER STREET, CLEVELAND, O.

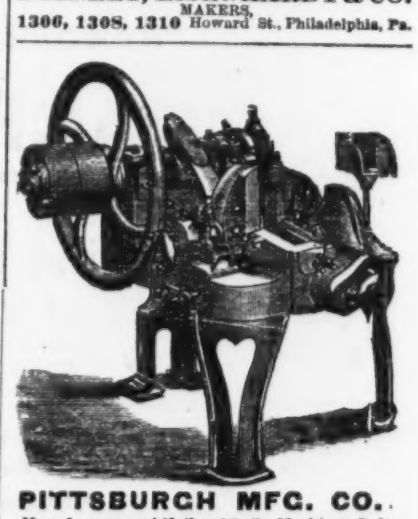


TURNED MACHINE SCREWS,
One-sixteenth to five-eighths diameter.
Heads and points to sample.
IRON, STEEL and BRASS.
JOHN FELLOWS,
(Successor to LYON & FELLOWS.) Factory and Office, 14 Dunham Place, Williamsburgh, N. Y.

DEAD-STROKE POWER HAMMERS.

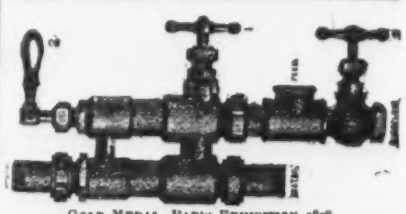
CONSTRUCTION IMPROVED.
Prices Reduced. *Seven Sizes.*
5 to 250 Pounds.

The 15 and 25 pound sizes are specially adapted for Filemakers' use, the other sizes for general forging.
Send for circular and references.
DIENELT, EISENHARDT & CO.
MAKERS,
1306, 1308, 1310 Howard St., Philadelphia, Pa.



PITTSBURCH MFG. CO.

Manufacturers of Nail and Spike Machines, Bolts, Nuts, Washers, Rivets, &c. Castings, Forgings and Blacksmith Work promptly attended to.
OFFICE & WORKS, Railroad St. near 28th., Pittsburgh, Pa.



GOLD MEDAL, PARIS EXHIBITION, 1878.

THE HANCOCK INSPIRATOR,

New Combined Pump and Injector.

Eclipses all other appliances hitherto introduced for feeding Steam Boilers. A Portable Boiler is not perfect without one. It lifts its water 25 feet with a low steam pressure, and puts it directly into the Boiler. No adjustment necessary for varying steam pressures.
G. W. STORER, General Agent, 149 N. 3d st., Phila.

BARBER'S PATENT COUNTERSINK.

Diploma awarded at Mechanics' Fair, Boston, 1878. Holes bored any depth, and countersunk for any size screw at one operation. $2 per doz.; discount in quantity. Sample by mail 50 cts. D. F. BARBER, 1321 Washington St., Boston.

CRANE BROTHERS MANF'G. CO.,

CHICAGO.

MANUFACTURERS OF
WROUGHT IRON PIPE,
STEAM PUMPS,
STEAM and GAS FITTINGS.
Steam and Hydraulic
Freight and Passenger Elevators,
STEAM HOISTING ENGINES
for Furnaces, Mines, &c.
Stationary Steam Engines, &c

Machinery, &c.

THE JUDSON GOVERNOR,

WITH

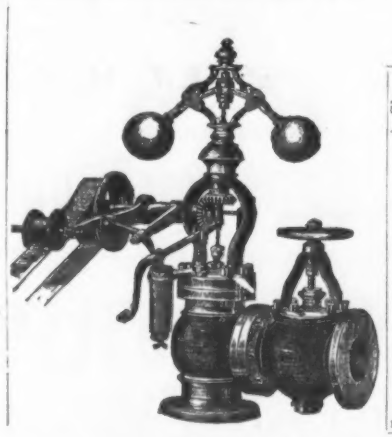
Stop-Motion,

Spring Speeder,

Sawyer's Lever

AND

Stop Valve.



PRICE LIST,

May 10, 1880.

Size, Inch.	Plain.	Bright Finished.	Extra for Spe'd'r	Stop M'V'lv & Spe'd'r
½	$15.00	$17.00	$1.60	....
¾	16.00	18.00	1.70	....
1	18.00	20.00	1.80	....
1¼	20.00	23.00	1.90	....
1½	23.00	27.00	2.00	$4.50
2	27.00	31.00	2.20	6.00
2¼	32.00	37.00	2.40	7.00
2½	36.00	41.00	2.60	7.00
2¾	40.00	46.00	2.80	8.00
3	45.00	52.00	3.00	8.00
3½	54.00	62.00	3.25	9.00
4	64.00	73.00	3.50	10.00
4½	74.00	84.00	3.75	11.00
5	84.00	95.00	4.00	12.00
5½	97.00	109.00	4.25	14.00
6	110.00	123.00	4.50	15.00
7	130.00	144.00	5.00	17.00
8	160.00	175.00	6.00	19.00
9	180.00	196.00	7.00	21.00
10	200.00	218.00	8.00	25.00

Warranted the most accurate, durable, simple Governor made, and consequently the most economical in fuel.

JUNIUS JUDSON & SON, Rochester, N. Y.

HARTFORD STEAM BOILER INSPECTION AND INSURANCE CO.

Issues Policies of Insurance after a careful inspection of the Boilers.

COVERING ALL LOSS OR DAMAGE TO

Boilers, Buildings and Machinery.

ARISING FROM

STEAM BOILER EXPLOSIONS.

The Business of the Company includes all kinds of STEAM BOILERS.

Full information concerning the plan of the Company's operations can be obtained at the

COMPANY'S OFFICE, HARTFORD, CONN.,

or at any Agency.

J. M. ALLEN, Pres. W. B. FRANKLIN, Vice-Pres. J. B. PIERCE, Sec.

Board of Directors:

J. M. ALLEN, President.
LUCIUS J. HENDEE, Pres't Ætna Fire Ins. Co.
FRANK W. CHENEY, Ass't Treas. Cheney Brothers Silk Manufacturing Co.
CHARLES M. BEACH, of Beach & Co.
DANIEL PHILLIPS, of Adams Express Co.
GEO. M. BARTHOLOMEW, Pres't Amer. Nat'l Bank.
RICHARD W. H. JARVIS, Pres't Colt's Fire Arms Manufactur'ng Co.
THOMAS O. ENDERS Sec'y Ætna Life Ins. Co.
LEVERETT BRAINARD of Case, Lockwood & Brainard.
GEN. WM. B. FRANKLIN, Vice Pres't Colt's Pat. Fire Arms Mfg. Co.
GEO. CROMPTON, Crompton Loom Works, Worcester
WILLIAM ADAMSON, of Baeder, Adamson & Co., Philadelphia.
HON. THOS. TALBOT, Ex-Governor of Mass.
NEWTON CASE, Case, Lockwood & Brainard, Hartford
WILLIAM S. SLATER, Cotton Manufacturer, Providence, R. I.
NELSON HOLLISTER, of State Bank, Hartford.
D. R. SMITH, Pres't Springfield Fire & Marine Ins. Co.

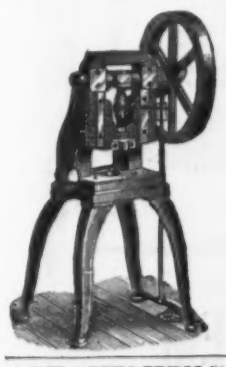
A. H. MERRIMAN,

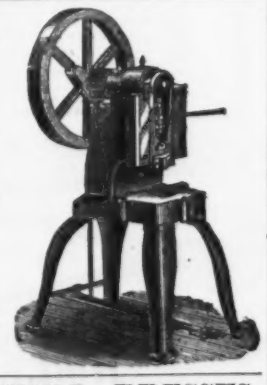
Patent Power

PUNCHING PRESSES.

WEST MERIDEN,

CONNECTICUT.





Judges' Report.—"He exhibits a power press, or punch, which is a well-made, substantial machine, and contains several features of marked originality, which materially augment its durability and efficiency."

ASTONISHING POWER IN PUNCHING PRESSES.

Punching by foot, 5-8 hole in 5-16 iron, and 3-4 x 1-4, 6 inches from edge. one man doing all the work.

Smaller sizes punch, by foot, 1-2 x 1-4, and 1 inch by 1-8, as rapidly as by power presses. They also shear 3-16.

Our largest hand machines punch, easily, 1 inch hole in 3-8 iron, and shear bar 3-4 x 2 inches at a cut, any length.

POWER PRESSES, all sizes, at lowest prices. When sending for Illustrated Catalogue, say what kind of work you wish a press to do.

PEERLESS PUNCH and SHEAR CO.,

52 Dey Street, New York City.

H. S. MANNING & CO.,

Sole Sales Agents for THE MORSE TWIST DRILL AND MACHINE CO.'S

Manufacture of Patent Machine Relieved Nut, Hand, Blacksmith and Machine Screw Taps, Screw Plates, Tap Wrenches and Patent Relieved Pipe Taps and Pipe Reamers, also of Solid Bolt and Pipe Dies. Furnished in U. S. Standard and Whitworth shape of threads.

111 Liberty Street. NEW YORK.

KEYSTONE

Portable Forges,

All sizes, for the lightest to the heaviest work, run by Chain Gear and Flat Belts. Strong blast and durable. Send for Catalogue and Price list to

KEYSTONE Portable Forge Co., 220 Carter St., Philadelphia, Pa.

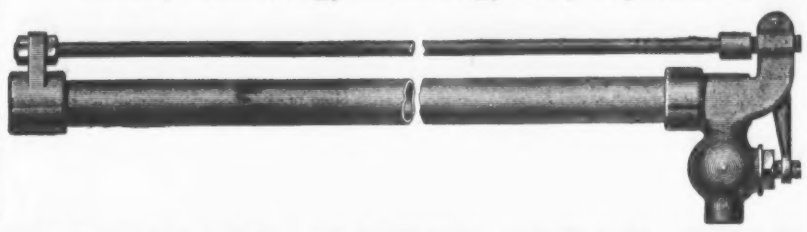
Machinery, &c.

WILLIAM SELLERS & CO.,

PHILADELPHIA.

MANUFACTURERS OF

Iron and Steel Working Machinery, Machinists' Tools, Shafting, Gearing, &c., Injectors.



MULTIPLIED MOTION STEAM TRAP.

Suits any Location. Price, $12.

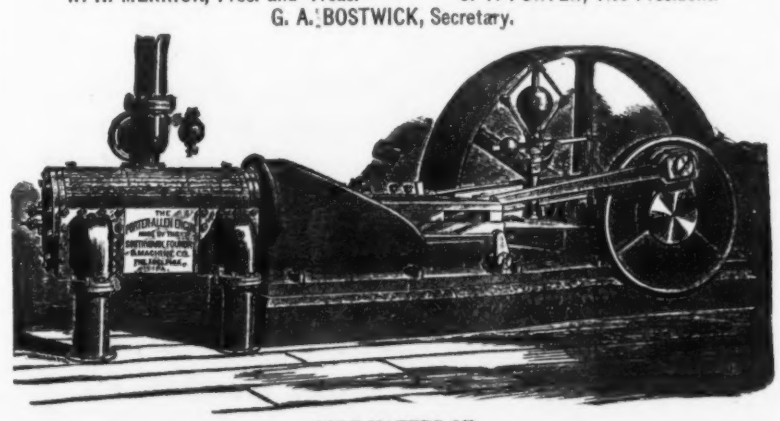
Send for circular giving particulars.

Branch Office, 79 Liberty Street, N. Y.

SOUTHWARK FOUNDRY AND MACHINE CO.,

W. H. MERRICK, Pres. and Treas. C. T. PORTER, Vice-President.

G. A. BOSTWICK, Secretary.



SOLE MAKERS OF

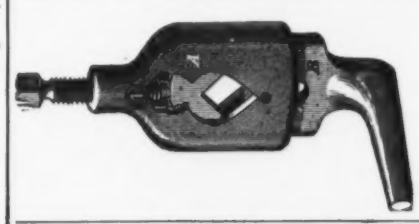
THE PORTER-ALLEN HIGH-SPEED STEAM ENGINE.

Belts and gearing dispensed with, for any speed up to 600 revolutions per minute. Especially adapted to Rolling Mill work, Factories and Electric Light machines.

Having extensive foundry facilities, the company are prepared to contract for Iron and Brass Castings. Prices and terms will be furnished on application.

THE SOUTHWARK FOUNDRY AND MACHINE CO.,

430 Washington Avenue, Philadelphia, Pa.



H. H. COLES & CO

Machinists and Manufacturers of

NORTH'S PATENT

Universal Lathe Dog

Which is very strong. Holds very strong. Will not deface finished work. Holds round, square or irregular work. Always stands up square with the work, and will not "skew." Is more evenly balanced than the common dog. Send for circular.

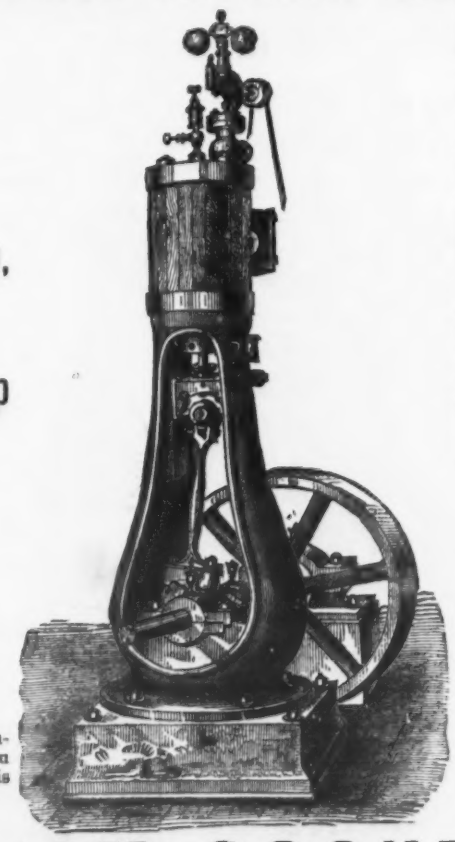
446 North Twelfth St., Philadelphia, Pa.

THE GREENFIELD VERTICAL ENGINE.

Is known for Neatness of Design, Superior Workmanship and High Finish.

PRICES LOW.

Send for descriptive circular, and please state that you saw the advertisement in this paper.



The steam joints are scraped and ground to a perfect bearing, thus obviating the annoyance of gum or paper joints. The shaft, piston rod, valve rod and cross-head pin are made of forged steel. The cross-head is fitted with composition gibs that are adjustable to take up the wear. The piston is fitted with spring rings. All the moving parts are evenly balanced, thus assuring steadiness and smooth running.

WILLIAM COOKE,

(Successor to COOKE & BEGGS.)

SALES AGENT,

6 CORTLANDT ST., NEW YORK, N. Y.

ACME STEAM PUMPS

FOR EVERY DUTY.

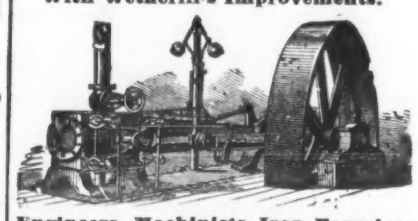
VALLEY MACHINE CO.,

EASTHAMPTON, MASS.

Machinery, &c.

Corliss Engine Builders.

With Wetherill's Improvements.



Engineers, Machinists, Iron Founders and Boiler Makers.

ROBT. WETHERILL & CO. Chester, Pa

Box's Patent Portable Double Screw Hoist.

With New Patent Self-Adjusting Chain Guide.

FIRST PREMIUM WHEREVER EXHIBITED.

Philadelphia, 1879; St. Louis, 1879

Always Reliable.

Is stronger, better made, will lift more, raises faster, works easier, and lasts longer than any other hoist in existence. Can be used in any position, even inverted. Single lifting chain that cannot slip, or leave the wheel when moving from place to place. Chain guide that will allow the operator to pull at angle of 45 degrees, and yet keep the same quantity of chain at all times on the wheel.

The Perfection of Hoisting Machines.

Manufactured in sizes from 500 lbs. to 20 tons.

Send for circular.

ALFRED BOX & CO.,

Northern Liberty Works,

312 & 314 Green Street, Philadelphia, Pa.

Also, Box's Patent Radial Drills, full line of Machinists' Tools, Drills, Engines, Shafting, Hangers, Pulleys, Hoists, Elevators, &c.

Established 1867.

Edwin Harrington & Son

MANUFACTURERS OF

PATENT EXTENSION, SCREW CUTTING GAP and TERRET

LATHES,

Iron Planers,

BORING MILLS,

Radial, Upright, Suspension Multiple and Lever

DRILLS,

and a variety of other MACHINISTS' TOOLS Patent

Double Chain Screw Pulley Blocks,

unrivalled for *Durability, Safety* and *Power.*

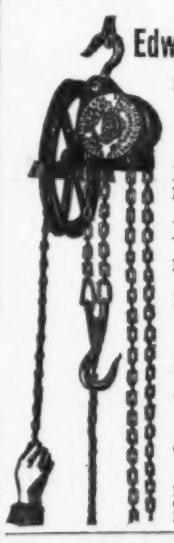
Patent Double Chain Quick-Lift Hoists,

with Brake for quick and easy lowering.

Circulars furnished.

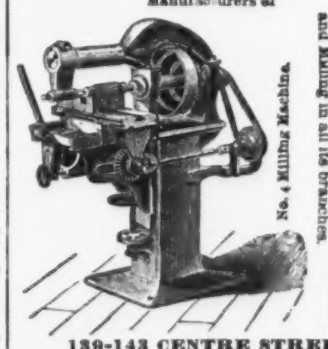
WORKS AND OFFICE, Cor. N. 15th and Penna. Ave. Philadelphia, Pa., U.S.A.

Represented by J. G. MAYNARD, 113 Chambers St. N. C. E. KIMBALL, 128 Oliver Boston.



E. E. GARVIN & CO.,

Manufacturers of



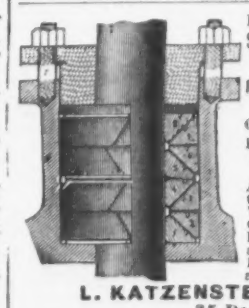
Milling Machines, Drill Presses,

Hand Lathes, Tapping Machines, Cutter Grinders and Wood Planers. Milling Cutters, all shapes and sizes. Gear Cutting and Milling in all its branches.

139-143 CENTRE STREET,

Cornell's Building, NEW YORK.

☞ Send for Illustrated Catalogue.



KATZENSTEIN'S

Self-Acting Metal Packing,

For Piston Rods, Valve Stems, &c.,

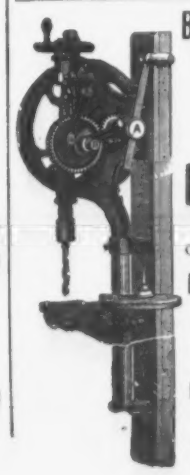
Of every description.

For Steam Engines Locomotives, Pumps, &c., &c.

Adopted and in use by the principal Iron Works and Steamship Companies within the last eight years in this and foreign countries. For full particulars and references address

L. KATZENSTEIN & CO.,

35 Desbrosses St., N. Y.



BOYNTON & PLUMMER,

Manufacturers

IMPROVED

Patent Drills,

Adapted to Blacksmiths' and Carriage Makers' use.

Bolt Cutters and Tire Benders.

From New and Improved Patterns. Also,

Hand and Power Shapers.

54 Vernon Street,

WORCESTER, MASS.